International Journal on New Trends in Education and Their Implications (IJONTE)

July, 2012

Volume: 3
Issue: 3

ISSN 1309-6249

http://ijonte.org

International Journal on New Trends in Education and Their Implications
April, May, June 2012 Volume: 3 Issue: 3 ISSN 1309-6249

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International Journal on New Trends in Education and Their Implications
April, May, June 2012 Volume: 3 Issue: 3 ISSN 1309-6249

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Dear IJONTE Readers,

International Journal on New Trends in Education and Their Implications- IJONTE appears on your screen now as Volume 3, Number 3. In this issue it publishes 14 articles. And this time, 39 authors from 14 different countries are placed. These are Azerbaijan, Brazil, Canada, Czech Republic, Finland, Germany, Kingdom of Saudi Arabia, Latvia, Poland, Serbia, Slovenia, Taiwan, Turkey and United Arab Emirates.

Colleagues that are in editorial board worked hard to determine the articles of this issue. There are also some articles that were presented in "3rd International Conference on New Trends in Education and Their Implications" that took place between 26-28 April 2012 with the contribution of 46 countries. Articles are evaluated by the referees that are either in editorial board or outside the board. According to the evaluations, some articles that were presented in "3rd International Conference on New Trends in Education and Their Implications" will also be published in our next issue.

Our journal has been published for over three years. It has been followed by many people and a lot of articles have been sent to be published. 102 articles have been sent to referees for forthcoming issues. They will be published according to the order and the results. Articles are sent to referees without names and addresses of the authors. The articles who get positive responses will be published and the authors will be informed. The articles who are not accepted to be published will be returned to their authors.

We wish you success and easiness in your studies.

Cordially,

1st July, 2012

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 01 ISSN 1309-6249

PEDAGOGICAL USE OF CELL PHONES IN CALCULUS I: ADVANTAGES AND DIFFICULTIES

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ABSTRACT

This paper aims at presenting two case studies, with use of cell phones in Calculus I classes, in the first semester of 2011, at a federal institution. Devices belonged to the students, to identify, in real context, advantages and difficulties of such use. Methodology was based on guidelines set by M-learnMat, a pedagogical model to guide m-learning (mobile learning) activities in Mathematics. It was developed by the authors of this paper, based on Activity Theory, and focus on Higher Education. This paper begins by providing an overview of the Activity Theory, and presenting the M-learnMat. This is followed by descriptions of the application of the model, specifying the resources for cell phones used and methodological procedures adopted. The article closes with considerations on the experiment, describing advantages and difficulties of using cell phones. Despite the difficulties, the experience was positive.

Key Words: M-learning, Cell Phones, Calculus, Pedagogical Model.

INTRODUCTION

Popularization of cell phones and evolution of technologies associated with them have highlighted these devices in actions related to m-learning[1] (Schmiedl G., Grechenig & Schmiedl B., 2010, Robles, González-Barahona & Fernández-González, 2011, Xie, Zhu & Xia, 2011). In particular, in terms of Mathematics, some studies also have investigated contributions of pedagogical use of these devices (Botzer & Yerushalmy, 2007, Baya'a & Daher, 2009, Nokia, 2009).

In this context, researches on cell phone use in effective educational practices are essential for understanding advantages and difficulties involved. Thus, in the first semester of 2011, two case studies were promoted. Cell phones were used in Calculus I, with two college level groups of students at a federal institution (traditional classroom). Devices used were the students', which allowed a better understanding of the complexity of working with different models of cell phones.

[1] M-learning (Mobile Learning) is a field of research that investigates how mobile devices can contribute to learning.

For these case studies, two free applications (apps) were selected, and quizzes to study the topics of Calculus I were prepared. In addition, the virtual environment Moodle was adopted, with MLE-Moodle plugin (which allows extending functionality of that environment to cell phones).

Teaching strategies adopted were based on guidelines set by M-learnMat, which is a pedagogical model for m-learning Mathematics activities. This model, developed with support of the Activity Theory, aims at orienting educational practices that involve the use (non-exclusive) of mobile devices in graduation courses and was developed by the authors of this article.

This paper describes the case studies promoted, reporting advantages and difficulties of the pedagogical use of cell phones, found within the classroom context. Section 2 provides an overview of the Activity Theory, and presents the pedagogical model M-learnMat, who guided the planning of teaching strategies. Section 3 shows a profile of students' cell phones, and describes pedagogical resources used in Calculus I. It also reports methodological procedures adopted in the case studies. Section 4 analyzes advantages and difficulties related to the use of mobile resources. Section 5 closes by presenting final remarks about this study.

M-LEARNMAT PEDAGOGICAL MODEL

M-learnMat[2] is a pedagogical model to guide m-learning activities in Mathematics, for Higher Education. This model allows analyzing aspects related to content and organizational, methodological and technological elements, in favor of pedagogical actions with more defined purposes. Pedagogical actions with a better foundation, clear objectives and organized forms of achieving them can enable a more adequate use of resources, more coherence with the real context and reduction in unpredictable situations. Activities that M-learnMat aims to guide involve the use, non-exclusive, of mobile devices.

The model is based on literature of m-learning (general and related to Mathematics) and concepts of Activity Theory (AT). This theory can be an important methodological resource for planning and analysis of strategies for educational activities in m-learning (Sharples, Taylor & Vavoula, 2005, Uden, 2007). Vygotskian ideas make up the foundation of AT and fundamental principles were established mainly by Leont'ev. The focus is on activities developed by individuals, and on the diverse relations resulting from them. Activity is considered responsible for the mediation between human beings and the reality to be transformed (Leont'ev, 1978).

Activities may vary according to form, method, emotional intensity, time and space requirements, and others. However, the main distinguishing feature of activities is the difference among their motives. Motives may be material or mental, they may be present in perception or, exclusively, in the imagination or thought (Leont'ev, 1978).

As to learning, AT considers it as an activity since it aims at satisfying cognitive needs (Nuñez, 2009). In this approach, formal learning has a social character which goes beyond the individual, as it takes place in active interaction with other people, through collaboration and communication, and mediated by tools and signs (Núñez, 2009). The relationship between an individual and his community is essential for activity (Engeström, 1987). In particular, learning in this approach is a specific type of structured activity, which involves actions and operations directed to a definite object, which the subject is aware (Davydov, 1982).

In addition to TA, the M-learnMat based on Behar (2009), which proposes a framework in which a pedagogical model is composed by a pedagogical architecture (PA) and strategies for its application. Thus, the M-learnMat structure (Figure 1) has an area corresponding to the AP and other related to strategies.

[2] <http://www.nie.iff.edu.br/projetomlearning/index.php?/m-learnmat.html>.

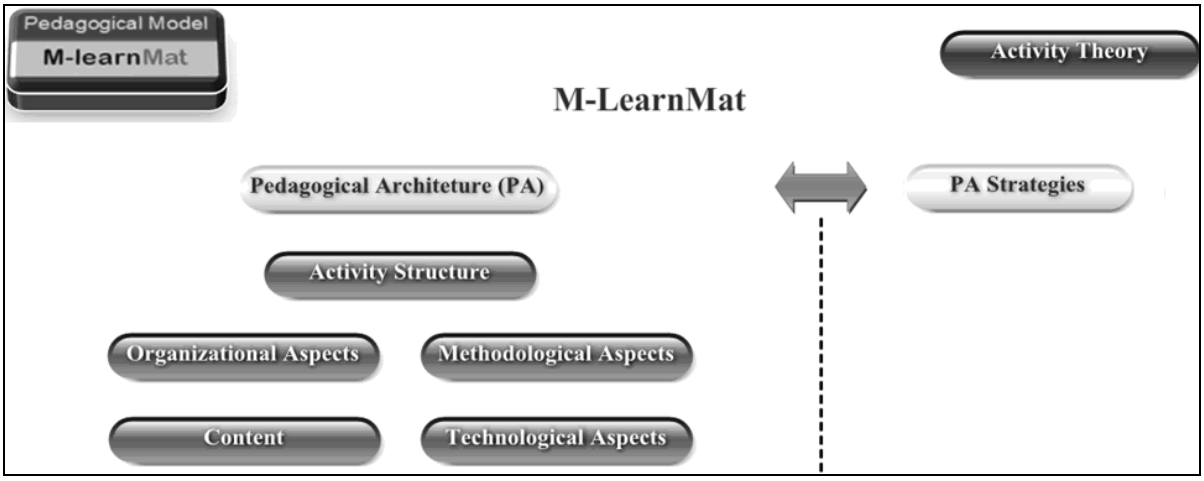

Figure 1: M-learnMat Structure

AP consists of five interrelated elements: i) Structure Activity; ii) Organizational Aspects; iii) Aspects related to Content; iv) Methodological Aspects; v) Technological Aspects. Strategies are ways of putting into practice the issues highlighted in the AP. Therefore, the M-learnMat only provides suggestions for strategies, because they depend on each teacher. This paper does not provide these strategies, but they can be found on the site of the M-learnMat.

In Figure 1, the double arrow between the area of PA and strategies indicates that changes are always possible, even during the development of planned actions, as advocated by Behar (2009).

Activity Structure is the basis for the other elements of the PA. It is an adaptation of Engeström's diagram (1987), which allows us to understand the relationship between the various components of Mathematics activity involving m-learning, in Higher Education. This structure indicates that the relationship between student and mathematical concepts is mediated by tools (including mobile devices) and signs. But in addition, this relationship is also mediated by rules, community and division of labor.

Organizational aspects of PA are related to the preparation of the Mathematics activities to be developed with the support of mobile devices. This includes, for example: i) analysis of the learning context with m-learning; ii) determining the motive of activity and action planning, identifying your goals; iii) setting rules, standards and procedures; iv) definition of roles of participants and technologies adopted; v) analysis of issues related to time and space; vi) definition of issues related to mobility.

Aspects related to the content include, for example: i) identification of requisites; ii) questions about the educational materials to be developed; iii) selection of apps for the device adopted; iv) organization of approaches to best use of the mobile device, aiming at learning.

In M-learnMat, methodological questions are oriented by the AT and, in particular, by Davydov's conceptions (1982). These aspects include: i) issues related to the formation of mathematical thinking; ii) forms of activity's development, iii) evaluation procedures; iv) identification of internal contradictions of the activity (Engeström, 1987).

Technological aspects are related to mobile technology, but not excluding use of other resources. These aspects comprise: i) recognition of the features of the mobile device to be adopted, ii) issues related to the use of mobile devices, including infrastructure, iii) integration of technologies.

M-learnMat can be adapted in order to guide several educational practices, involving different mathematical content and mobile devices. In this paper, we highlight that M-learnMat guided the planning of teaching strategies adopted in the case studies described in the following section.

CASE STUDIES: CONTEXT, PEDAGOGICAL RESOURCES AND METHODOLOGICAL PROCEDURES

This section initially presents a profile of the students' cell phones, in order to provide an overview of the context in which the case studies were promoted. Next, it describes the mobile learning resources that support the subject Calculus I and procedures adopted.

Context's Features: profile of the students' cell phones

Data in this subsection were obtained at the beginning of the first semester of 2011, by questionnaire. These classes were: 1st period of Information Systems, Bachelor's Degree (daytime classes), and 1st period of Systems Analysis and Development, Technologists (evening classes).

The questionnaire had questions related to cell phones, to the use of resources, to their ability of using the keyboard, and to the use of mobile devices in education, among other topics. In the research, 27 bachelor students and 41 technologists answered the questions.

All participants reported having cell phone (regular or smartphone), with predominance of the regular devices, as shown in Table 1. For all the tables in this subsection, 100% of the cells phones corresponding to 27 devices in the case of bachelor students and 41 in technologists classes.

Table 1: Cell Phone: Kinds

Options / Classes	Regular (%)	Smartphone (%)
Bachelor students	74.07	25.93
Technologists	82.93	17.07

Cell phones, therefore, was a popular device among the participants, but few students had smartphones. Thus, although the educational institution in question to grant WI-FI access, few were able to use the same with their devices.

Among the seven smartphones of the bachelor students, there were two different operating systems and among the seven of the technologists, three. How many apps are still specific to certain operating systems, this variation is a factor that may complicate the adoption of an educational app, even in classes where everyone has smartphones. Adoption of Java ME apps can be an alternative to this problem, since many phones have this platform.

The questionnaire also gathered data related to the Java ME platform on students' cell phones. Among the bachelor students, about 70% of the cell phones had such platform and among technologists, this percentage was approximately 61%. Regarding Bluetooth, about 59% of bachelor students' devices and approximately 76% of technologists' cell phones had this technology. Bluetooth can be very useful for transferring files with no costs involved.

Table 2 shows the percentages related to the skill in dealing with the phone's keypad. Categories "Good" and "Excellent", analyzed together, amount to about 59% among bachelor students and approximately 71% among technologists. In educational terms, in general, the percentages obtained were positive, since no one considered his skill as "Awful" and only one student considered as "Bad".

Table 2: Phone Keypad: Skill

Options / Classes	Awful (%)	Bad (%)	Average (%)	Good (%)	Excellent (%)
Bachelor students	0	3.70	37.04	44.44	14.82
Technologists	0	0	29.27	43.90	26.83

Table 3 shows the percentages related to the costs of cell phone use. Question investigated whether this cost was still a limiting factor of use of resources.

Table 3: Costs: Limiting Factor of Cell Phone Use

Options / Classes	Yes	Partly	No	Didn't Answer
Bachelor students	37.04	29.63	22.22	11.11
Technologists	29.27	51.22	12.19	7.32

In Table 3, the categories "Yes" and "Partly", considered together, show that cost, to these students, was a factor influencing the use of the cell phone.

Regarding the use of mobile devices in education, all students were in favor, indicating that this proposal was widely accepted.

Pedagogical Resources

After analyzing data about cell phones, apps that run on Java ME were sought, to achieve the greatest number of students. Graphing Calculator and Graph2Go were chosen. Both are free, but in English, because apps equivalent in Portuguese were not identified.

Graphing Calculator[3] (Figure 2a) is a graphic scientific calculator that draws the graph of up to three simultaneous equations (2D) and also the graph of functions defined by two sentences. The version used in Calculus I was 0.97.

[3] App developed by Anthony Rich. Available at <http://www.getjar.com/mobile/36442/graphing-Calculator/>.

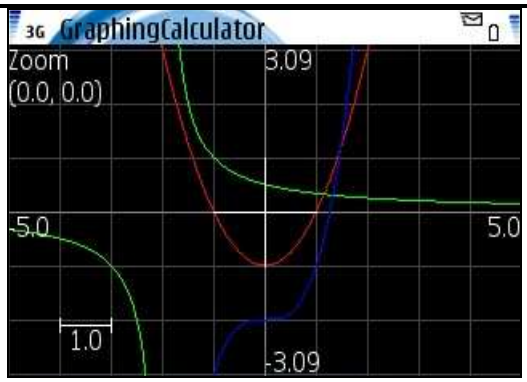

Figura 2ª. Graphing Calculator

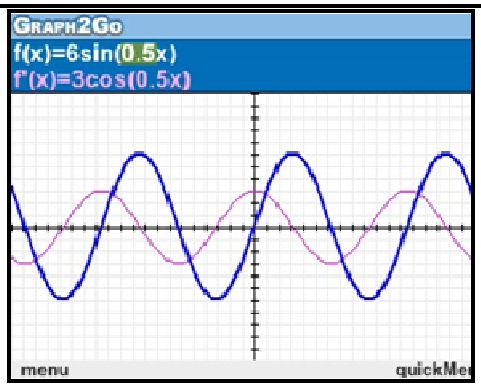

Figura 2b. Graph2Go

Figure 2: Apps

Grap2Go (Figure 2b) is an app developed in Math4Mobile, a project of the Institute for Alternatives in Education, affiliated to the University of Haifa, Israel, coordinated by Michal Yerushalmy and Arik Weizman. Graph2Go operates as a graphing calculator for a given set of functions, allowing connections between graphic and algebraic representations, through dynamic changes. This app also allows plotting the derivative function and calculating the area under the curve at a certain interval. The version used was 0.84.

Besides these apps, the platform Moodle with MLE-Moodle[4] plugin was used. The project Mobile Learning Engine (MLE) started in 2003 as a diploma-thesis by Matthias Meisenberger (MLE-Moodle, 2009). Through this project was subsequently developed the MLE-Moodle, a plugin that enables extending Moodle functions to cell phones.

Access to the MLE-Moodle, by cell phone, can be accomplished in two ways: through the browser or using the MLE Client, a special module to be installed on the cell phone. When installing the MLE plugin, all Moodle courses start to count on these two options. Both require Internet connection, however, installing the MLE Client, the user can download some resources to the cell phone and then access them without the need for Internet connection. In turn, direct access by the browser is more practical.

When the MLE plugin is installed, an editor for creating pedagogical materials can be used by teachers. This editor works within Moodle and allows, for example, create quizzes for cell phones. The quiz is saved to the topic it was created. From this, it can be viewed and replied to MLE-Moodle (via browser or MLE Client) and also in traditional Moodle. Figure 3 shows a quiz seen in the cell phone.

[4] Mobile Learning Engine – Moodle. <http://mle.sourceforge.net/mlemoodle/index.php?lang=en&page=download.php>.

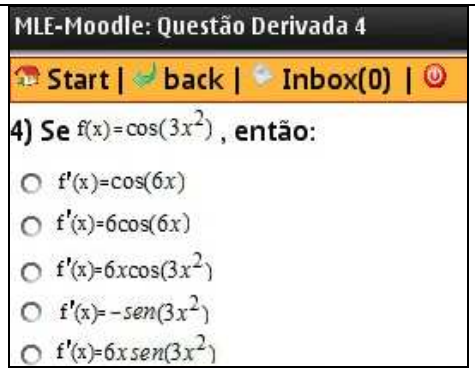

Figure 3a: Phone Browser

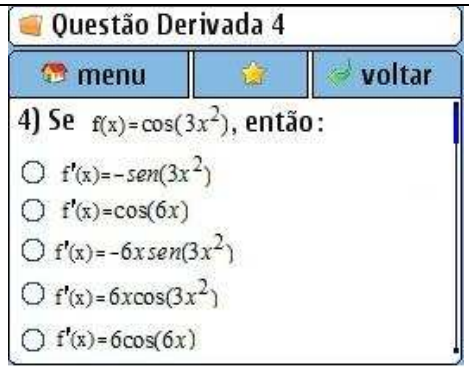

Figure 3b: MLE Client

Figure 3: Sample Quiz - MLE-Moodle

The order of the alternatives may change each entry, if the option random is chosen during the development of the quiz. For this reason, in Figures 3a and 3b, the alternatives are in different orders.

In the case studies, the MyMLE[5] was also used. It is a computer program to create quizzes and other pedagogical materials for cell phones with Java ME platform. After preparation, the materials are sent to the cell phones, together with the environment MyMLE (via Bluetooth, for example), and can be used without requiring Internet connection.

Estratégias Metodológicas

In teaching Calculus I (1st semester of 2011) to two college-level classes at a federal institution, we perform case studies using cell phones. These classes were: 1st period of Information Systems, Bachelor's Degree (daytime classes), and 1st period of Systems Analysis and Development, Technologists (evening classes). Both are conventional classroom courses with the same number of hours (80 h) and content (Limits and Continuity, Derivatives, Integrals).

For data collection, the following techniques were used: observation, registers in the virtual learning environment, and questionnaires. The adopted mobile device was the student's cell phone and virtual learning environment used was Moodle, with the MLE-Moodle plugin. A mixed methods research (quantitative and qualitative) was used due to the characteristics of the data. However, the quantitative analysis used only techniques of Descriptive Statistics. This field of Statistics encompasses a set of methods for the organization and description of data

In addition to the mobile device and the learning environment, several other aspects were common to both classes (content, materials, and group activities, among others). Therefore, it was possible to organize, according to the guidelines of the M-learnMat, a series of common strategies for both courses, such as: i) use of technological resources, especially mobiles, as mediating artifacts – collaborating means to reach the main motive of the discipline; ii) group activities based in problem solving; iii) discussion of the historical origin of each topic (Limits, Derivatives and Integrals); iv) incentive to generalizations, thus contributing to the development of mathematical thinking (the objective is not the solution of specific questions, but the acquisition of tools to solving various questions); v) an understanding that the student is the agent of his learning process, that the teacher acts as mediator, and that the exchange of knowledge among peers is an essential factor.

[5] Free *software,* available in: <http://mle.sourceforge.net/mymle/index.php?lang=en&page=download.php>.

Mobility, in the discipline described here, was considered in the use of: i) MLE-Moodle resources, which allow access to the course at any time and location; ii) applications for cell phones, which took place in the classroom or not; iii) quizzes which, like the applications, could be accessed from anywhere, and with no need of an Internet connection.

The virtual learning environment Moodle, with MLE-Moodle plugin, increases the possibility of access to course materials and, therefore, contributes to better utilization of students' time. Each topic opens in the Calculus I course in Moodle was always closed with a series of quizzes, so that students could check their knowledge. These quizzes served the function of additional exercises.

However, using the MLE-Moodle requires Internet connection, which not all students had on their cell phones. Thus, the strategy of developing the same quizzes using MyMLE was adopted, so that students who could not use the Internet, using at least quizzes, in addition to apps.

Apps supported group activities based on problem situations, held in the classroom. With the support of the apps, it was more practical to analyze the graphics associated with the proposed questions.

Guidelines to using the apps were available in the Moodle environment, as well as mobile tags (2D codes, similar to bar codes, but with two dimensions) referring to the URLs, in order to facilitate access for those with Internet connection. Students without such connection transferred the apps to the computer and, then, sent them to their phones, via Bluetooth or USB cable, for instance. Following section promotes an analysis of case studies.

PEDAGOGICAL RESOURCES: ADVANTAGES AND DIFFICULTIES

The case studies using students' cell phones, for one semester, indicated real advantages and difficulties associated with such use. However, the context is particular and not allow for generalizations. Despite this, the data shown are relevant because they allow reflections and better planning of other actions in conditions similar to those analyzed.

It is important to note also that, in the beginning of the semester, most students were entering their college program and, therefore, not even feel part of a group, since they were still getting acquainted. Moreover, the contents in Calculus were quite different for them, as they demand a number of pre-requirements and abstractions. Therefore, students had to become familiar with the colleagues, and the pedagogical proposal for the subject Calculus, as well as the methodology, strongly supported on technological resources.

It must be emphasized that 54 of the 68 students who answered the initial questionnaires (around 79%), said they had never used any software for studying Mathematics. Therefore, even typing functions in the Graphing Calculator was a novelty for most learners (even though this kind of typing is similar to most Mathematics computer programs).

After the initial phase (about one month), which included the transfer process and the learning of use of resources, the procedures became more natural. However, as discussed, many devices could not run the apps and quizzes, for lack of Java ME. Also, the Internet, which is a very important tool in educational terms, was not accessible to all. However, these situations are very circumstantial and tend to be minimized with technological advances and falling prices.

It was observed also that in some devices using the Graphing Calculator app was simpler than others, because of features of the keyboard. Entering formulas in the case of this app is a process that can be tiresome,

depending on the expression and cell phone model. Thus, ease of use of a resource in the cell phone is not simple to be evaluated, because there is great influence of the device used.

With regard to quizzes, their use was not a very simple process for students who did not have easy access to the Internet. It was necessary to make the transfer and installation of each series of quiz on the cell phone. Thus, in general, students transferred some series available, but not all. For those who could access the mobile Internet, the process was much simpler, using the MLE-Moodle.
Certainly, the case studies also indicated advantages of pedagogical use of cell phones, in formal education:

i) practicality in mathematical investigations, which contributes to reflections, individual and group, on the concepts discussed;
ii) autonomy in the exploration of concepts, which helps the student to take a more active role in their learning and improve their relationship with Mathematics;
iii)better use of time.

However, it is important to consider that some advantages are directly related to the strategies adopted by the teacher.

During the semester, we observe the development of the proposed strategies. In order to obtain other data related to them, a final questionnaire was used and records of Moodle were analyzed. The final questionnaire consisted of 17 statements, on which each student should be positioned in one of the options given: “Strongly agree”, “Agree”, “Neither agree nor disagree”, “Disagree”, “Strongly disagree and Not Applicable”. The option "Not Applicable" (NA) is justified by the fact that not all students have adequate resources on their cell phones and, therefore, might not be able to evaluate all statements of the questionnaire.

In the tables related to final questionnaire, 100% of the participants account for 13 bachelor students, and 26 technologists (total number of students who completed the semester[6]). In this paper, only the statements more directly related to pedagogical use of cell phones are highlighted.

Final questionnaire proposed the following statement: "Apps were relevant resources for the resolution of problem situations." Table 4 presents the results.

Table 4: Apps: Relevance

Options / Classes	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)	NA (%)
Bachelor students	30.77	38.46	7.69	23.08	0	0
Technologists	30.77	19.23	15.38	3.85	0	30.77

The percentage of agreement in Table 4 was probably influenced by the fact that not all students were able to use apps on their cell phones. There are 69.23% of bachelor students and 50% of technologists in the options “Strongly agree" and "agree", taken together. The best assessment by bachelor students is probably related to the fact that they were more active in the resolution of problem situations, which were supported by apps.

However, if the analysis is done by the percentage of disagreement, it is observed that only 3.85% of technologists and 23.08% of bachelor students disagreed. Therefore, in general, percentages in Table 4 were positive. They are consistent with the observed reality in the classroom.

[6] Computer courses (Higher Education) of the institution in question, have problem of evasion, especially the daytime classes.

Related to ease of use of the apps, the final questionnaire had the following statement: "Apps used in the course were easy to use." Table 5 shows the results obtained.

Table 5: Apps: Ease of Use

Options / Classes	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)	NA (%)
Bachelor students	7.69	30.77	30.77	7.69	23.08	0
Technologists	19.23	26.92	19.23	0	0	34.62

Data in Table 5 shows that the percentage of agreement, considering together the options "Strongly agree" and "Agree", did not reach 50% in any of the classes. A significant percentage opted for the alternative “Neither agree nor disagree”. Thus, in the view of students, the ease of use of the apps can still improve. However, as already mentioned, this aspect is very much influenced by the equipment used, therefore, it is impossible to analyze clearly the same. A more rigorous analysis would require testing with similar phone models (which has not been promoted).

Related to the quizzes, the following statement was proposed: "Quizzes were relevant resources for learning content." Table 6 presents the results.

Table 6: Quizzes: Relevance

Options / Classes	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)	NA (%)
Bachelor students	0	30.77	61.54	7.69	0	0
Technologists	15.38	34.62	15.38	3.85	3.85	26.92

Quizzes also required Java ME platform, which not all had. Moreover, while these resources could be accessed at any time and place, they demanded, for many students, a transfer process to the cell phone. Technological evolution tends to minimize technical problems, but the relevance of quizzes for learning should always be reflected, since they have low interactivity and slightly reflect the potential of mobile technologies.

In Table 6, the percentages show that, for technologists, these resources were more relevant than for the bachelor students. This fact is attributed to the context of the class of Technology, which had a greater number of students who felt more comfortable in front of a more conventional proposal, like the quizzes (direct application of the contents studied).

With regard to the practicality of quizzes, the following statement was proposed: "Quizzes are practical resources." Results are shown in Table 7.

Table 7: Quizzes: practicality

Options / Classes	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)	NA (%)
Bachelor students	7.70	46.15	46.15	0	0	0
Technologists	11.54	34.61	15.38	3.85	3,85	30.77

Percentages indicate a better agreement rate than the observation, during the semester, it would take to consider, judging by the process of transfer of each block of quizzes (necessary for those who could not use Internet). But, once installed, the quizzes are simple to use. Again, percentages in Tables 6 and 7 on the option "Not Applicable" may be justified by the lack of Java ME on the cell phone.

A joint analysis of the options "Strongly agree" and "agree" in Tables 6 and 7, allows us to observe that the percentage of technologists was slightly larger in the statement about the relevance (50%) than in the aspect practicality (46.15 %). Among bachelor students, the evaluation of the practicality aspect (53.85%) was better than the aspect relevance (30.77%). These percentages are consistent with the characteristics of the classes observed. Some bachelor students had ease with content, as well as skill with technology, which allows us to understand the positions taken. The technologists generally had less time available for study. In this sense, an educational proposal more objective, like the quizzes, assumed a greater importance to them. But at the same time, the transfer of quizzes for those who have not had much time was an additional task.

With regard to access to the MLE-Moodle, the following statement was proposed in the final questionnaire: "Access to the MLE-Moodle on the cell phone, in general, was simple." Table 8 presents the results.

Table 8: MLE-Moodle: Ease of access

Options / Classes	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)	NA (%)
Bachelor students	7.69	23.08	38.46	15.39	7.69	7.69
Technologists	7.69	7.69	19.23	3.85	3.85	57.69

Access to the MLE-Moodle demands Internet, which requires devices with resources for that purpose and often involves cost. As mentioned, few students were able to use Wi-Fi provided by the educational institution, due to technological limitations of their devices. The percentage of technologists in option "Not Applicable" is indicative of this situation. The evaluation of this statement may have been too influenced by the cost factor. As shown by the data in Table 3, cost is a factor that also influences the use of resources of cell phone.

Therefore, it was not possible to analyze the usability of the MLE-Moodle, since the evaluation may have involved other factors. Furthermore, analysis of these factors also allows understanding that the data in Table 8, when presenting a low percentage of agreement, reflect the reality of the community considered.

For an overview of the pedagogical use of cell phones, the following statement was proposed in the final questionnaire: "Cell phones were relevant for the study of Calculus I". Table 9 shows the percentages.

Table 9: Cell Phones: Relevance

Options / Classes	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)	NA (%)
Bachelor students	30.77	30.77	7.70	15.38	15.38	0
Technologists	34.61	30.77	19.23	0	3.85	11.54

Given the context of two classes, the percentage of Table 9, considering jointly the options "Strongly agree" and "Agree" (61.54% among bachelor students and 65.38% among technologists.) was a good acceptance rate.

In general, the technology many cell phones did not contribute to the pedagogical use of the same and thus also the percentage of disagreement is understandable.

FINAL CONSIDERATIONS

In Mathematics, digital technologies create possibilities, allowing simulations, visualizations, experiments, among other actions. M-learning adds extra possibilities, such as practicability, mobility, reaching a higher number of people, learning in real contexts, among others. In particular, cell phones have great potential to collaborate to the learning of Mathematics, contributing to views and analysis in a practical way, at any time and place.

In the case studies described, it was observed that the educational use of students' cell phones for educational purposes, under the conditions of the classes considered, it still involves several complicating factors. These difficulties tend to decrease with technological advances and popularization of resources. However, a better understanding of these problems highlights the relevance of the study promoted.

Pedagogical use of cell phones will become more practical with the popularization of smartphones. Devices with many technological limitations restrict, or even make it impossible, such use. However, the choice of apps yet will require care, because some are specific to certain operating systems, do not work in other. Resources that work in various models, such as those that require only the Java ME platform, can contribute to this. The analysis of minimum requirements is, therefore, a key issue for pedagogical use of apps in cell phones, unless a standard device is adopted.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 02 ISSN 1309-6249

NEW TRENDS IN FRENCH SECOND LANGUAGE (FSL) EDUCATION IN ONTARIO AND THEIR IMPACT ON TEACHER EDUCATION

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ABSTRACT

New curriculum guidelines for FSL (2011) will most likely only be implemented starting September 2012. First discussed in 2009, the advocated new grammar approach and the heavy cultural content have subsequently created a number of reactions, the most recent required another set of consultation meetings. In addition the new assessment perspective, in line with the European Common framework of references for languages, although seen as favorable for learning meets with a set-in rigidity. Needless to say, some of the stakeholders foresee great expenditures associated with new recommendations because of teachers who will have to be given upgrading courses among other things. Also interesting is the fact that some of the recommendations, not yet voted in for implementation, are already receiving very positive feedback and have even been implemented in some school boards, for instance a Grade 9 Beginner French course (corresponds to the 9th year of schooling in Canada). It appears that audiences are receptive to formulations that fill identified learning gaps. We will also discuss how plans to implement best practices can meet with resistance. A study was conducted to investigate a number of aspects connected to the new implementations. Findings will be reported and recommendations made.

Key Words: New grammar; culture teaching; impact of assessment *Can Dos*.

SITUATIONAL CONTEXT

This study was carried out in the province of Ontario, in central Canada, on new trends for French as a second/foreign language education. French is one of the official languages in bilingual Canada, the other being English. New curriculum guidelines are being implemented and there are various reactions to the new contents as well as resistance.

Canada is a country with a large population of newcomers which means many cultures and many languages are in contact; for instance in Toronto, the largest city in Ontario, on Saturday mornings there are up to 26 different heritage languages classes held because in Canada we believe in sustaining as much as possible the languages of the country of origin as they provide a foundational base on which further language and educational developments can thrive.

Here educational matters are a provincial responsibility. In the province of Ontario we experience regular changes in the ruling political party which makes changes in Educational programs easy to implement as each new group in power attempts to improve upon the previous situation. Programs are reviewed regularly and new curriculum guidelines are published after intensive consultations and reviews over a number of years with the involvement of all possible stakeholders.

After the decision was made to review the French Curriculum guidelines three years ago, The Ministry selected two subject specialists to lead the process along with their on-site personnel. Among the first steps, consultation meetings were scheduled with regional specialists from universities and with a view to linking new developments with the latest research publications in the field and gaining information and know-how of researchers in charge of French teacher education. Following these, the leading committee worked on a draft which was then distributed widely for further discussions and consultations. Amendments to the proposed documents were made after all recommendations judged to be relevant were taken into account but also endorsed or vetoed by Ministry personnel, principally with a look at costs involved. Following this, a team of writers worked on a more detailed draft. More consultation meetings took place including teachers and university specialists alike, after which the complete final draft was to be elaborated.

It has taken three years already and the publication of the new documents is expected for the Fall of 2012. In the meantime drafts were circulated and information videos were placed on-line as well as additional advertizing was carried out in the form of placing on-line the filming of exemplary classroom practices using the newly advocated approaches (OMLTA.org).

With a large population of newcomers, there are many cultures in contact due to immigration policies and there are also very different views expressed as regards curriculum implementations both on the part of teachers in schools and the future teachers at Faculties of Education. Multiple views imply multiple forms of understanding and different ways of apprehending the recommended contents.

In addition, traditional linguistic and socio-cultural competence developments aiming at preparedness for diverse student populations in the schools are no longer able to encompass the large array of diversified backgrounds from which student populations originate. In the light of the influx of newcomers to Canada who, often until now, were not familiar with either of the country's official language, English or French, innovative ways to see to language education were a must.

BACKGROUND INFORMATION TO THE STUDY

This study was carried out in the context of a teacher education course with 5th year university students at a University with a Faculty of Education in Ontario. The teachers in training have to come to grasp the different degrees of difficulty and the different amounts of detail involved in acquiring professional know-how (Berger 1972; Banks & Banks 2007; Skehan 1998; Slavin 1995) and at the same time understand that these have to be weighted accurately. In researching the relative importance of how people make their interpretations, especially around implementing new ways of teaching (Anderson 1985; Bygate 1987; Forster 1989; Goodman 1990; Rivers 1981; Stern 1983), one has to acknowledge that they always are only tentative, with constant fluidity and flux surrounding any situation. This 'professional' socialization process can be compared to the Acculturation Model (Brown 1980: 129) during which learners undergo a phase of adjustment to the new culture, namely the culture of teachers. The adjustment usually occurs through what Brown (1980: 129-144) identified as four stages: Exposure, Shock and Resistance, Recovery, and Adjustment. All of these fall within a regular action-reaction communication process leading to the acceptance and the swap of linguistic and cultural aspects of Native Language or Teaching Culture, what I consider here to be the observed teaching experience when the future teachers were pupils in schools and Target Language or Teaching Culture (TLC), the culture which the university course instructor is trying to inculcate. This fits the constructivist approach in knowledge building. In the case of this study we are applying these concepts to second language (namely French) language teachers and we can call the acculturation process the Target Professional Culture (TPC). This may imply a change of beliefs so as to develop professional judgment in light of the new curriculum guidelines imposed by the Ontario Ministry of Education for French as a second language for 2012.

Accepting new beliefs leads to transformation and there is no going back. It also involves continuous effort. In teaching, one needs to move beyond basic curricular aspects to gain an understanding of human difference and mostly accept and make-do with diverse ways of being and otherness. Dialogue and interactive ways of developing awareness and contact with others, especially the teachers in the field during the practice teaching placements, was expected to promote the necessary understanding. The question was then, if some of the associate teachers in the schools are not up-to-date as regards the new implementations, how would our students benefit from their input and through what means would we have proof that the outcomes were of the type deemed to be desirable in the profession? Key in communication is not limited to identifying the differences and difficulties but going beyond in the exploration to find the elements that are hard to internalize. So it was of crucial importance to have the students reflect on their experiences in schools and see how these corresponded to the outcomes desired by both the university instructor and the expectations of the Ministry of Education.

Some theoretical insights

Teachers' discourse and culture in language classes have always been an interesting topic for educational researchers because of their wide scope of use and their cultural diversity (Danesi & Perron 1999; Searle 1994; Swan 1985), which is often influenced by the clash of two language and cultures; First Language Culture (FLC) and Target Language Culture (TLC). Cultural integration into language classes is so important that there are those who would emphasize the idea that teachers should not only be language specialists but also culture professionals who are able to build cultural bridges between a First Language (FL) and a Target Language (TL) (Willems 2002). It is true that in many ways, both are involved in a communication process that determines those cultural aspects that can be considered shareable and exchangeable between the two existing cultures in the classroom; a two-way language communication transaction between the two cultures (Morlat 2009; Schulz 2007; Seelye 1976; Steele & Suozzo 1994; Zarate 1986). Such values constitute what I would call a language business transaction that deals with shareable daily consumed cultural goods, i.e., cultural tradable commodities between the transmitter and the receiver. It is inevitable that communication between two languages involve intercultural communicating as well, which, in turn, would mean that both teachers and learners would have to find common ground on factors of cultural differences and similarities, i.e., determine those cultural aspects of both languages that are shareable, interchangeable, and meaningful for both teachers and learners in any communication instance in language classes. Such kinds of differences and similarities exist in every language: the tone of voice, appropriate topic of conversation, expressions, and speech act functions like apologizing, suggesting, complaining, refusing, etc., all of which are in constant and continuous reciprocal validation and integration that help the creation of a neutral common area for sharing and exchanging cultural commodities. Building on the above arguments, one could definitely state that language is the linguistic manifestation of culture and culture is the behavioral manifestation of language. The two are considered as twins conjoined by cultural commodities which one cannot separate without risking or compromising the significance of either language or culture (Brown 1994: 164). Furthermore, there is the idea that the presentation of an argument in a way that sounds fluent and elegant in one culture may be regarded as clumsy and circular by members of another culture. For example, Latinos or Arabs are used to what I call a pre-request preparation discourse before asking for something or some service, such as greetings, asking about work, family, and friends, and only after would they venture into the main topic. Americans consider such linguistic pre-request interaction as a waste of time and that if one needs some service, one should directly ask for it. Such differences could help either of the communicating groups to condition their linguistic behavior according to the target culture by identifying what is considered as valid and of cultural value in both cultures in order to allow for a clear and efficient cultural transaction. Whatever the value of transaction in cultural commodities between the learners-traders may be, it is undeniable that language is the channel of communication with which such shareable commodities are transmitted and exchanged. Both cultures agree to communicate through language which, in turn, determines the significance value to the traded cultural aspect through linguistic interchanges. Such interchanges help convert the intangible collective linguistic and non-linguistic behavior of both cultures into a concrete valuable tradable behavior that is accepted, assimilated and

exchanged by both (Barton & Tusting 2005; Olson 2003; Wenger 1998). This process, which can be referred to as "*socialization of language,*" prepares the individual for the linguistically and non-linguistically accepted patterns of a target culture.

Prescribed curriculum innovations

The targeted professional developments to come under scrutiny in this study are namely the new grammar approach, 'cultural teaching' and the Can-Do approach for the assessment of skill development and competence in performance.

The talk is about the 'new grammar' approach, with grammar seen in the context of language use in authentic texts.

Culture teaching takes on a foundational role in second language teaching as evidenced in the new French Curriculum guides (Ministry of Education forthcoming).

Evaluating student competencies is no longer haphazard but carefully aligned on the European Reference Framework for Languages (Conseil de l'Europe 1996; McNamara &McNamara 1996) , although adapted to the Canadian context based on what students *Can-Do*. That includes different perspectives on learning, not with one learner set against another (Lado, 1957; 1961), but with true evaluation set against a backdrop of criteria allowing autonomous progression with each student measuring personal progress and learning over time.
These aspects imply a lot of changes and with change, our attitude towards a situation will depend on our perception of the situation. Students are required to put on "new lenses" as if looking at everything for the first time.

Description of the study

There were 25 participants in the course for Secondary French teacher preparation in this study from September 2011 to the end of April 2012. The duration of the course was 15 weeks with two times two and a half hours per week of class meetings with, in-between placements in the schools to gain practical experience. Students' expectations and learning needs greatly varied among the students because of the diversity of their backgrounds. Currently there is a great demand for teachers of French but not any longer for other teaching specialties. For this reason a lot of students who did not plan to become French specialists, but have Fine Arts, Geography, etc. as their other teaching specialty decided to enroll in French for better employment opportunities. In this study we analyzed the answers to open-ended questions administered to all the participants. No names were entered on the answer sheets and anonymity was maintained. All participants gave written permission for the results to be used in the analysis and for the summary of results. The questionnaires were administered for the purposes of articulating a distinctive professional knowledge base for FSL teachers with the hope to identify a break from what they observed in schools during their school teaching practice and a way to articulate personalization in these learning professionals by having a look at where they were at the end of the course**.** The three areas under scrutiny that are reported here are the 'new grammar' approach, cultural teaching and the 'Can-Do' perspective on assessment. The answers were coded using the participant number out of 25, the question number and sub-question numbers. For instance 22/3/a stands for participant paper number 22, answer to question 3 subsection a.

The 'New Grammar Approach'

The students were made to understand that children's natural communication skills need to be sustained, developed and directed at continually seeking to expand in order to meet the challenges of constantly having to adapt to difference. It would enable them to approach interaction with the purpose of coming to an understanding and acceptance. They understood that the same thing was expected of them as they had to model those very interactive aspects in a Social Action Approach (Banks 1997). The decisions to be made were around the best way to teach communication in an intercultural second language classroom.

Everyone may not equally attempt to participate and some people will need to be encouraged. From situated cognition as a theoretical model (Wenger 1998; Lave and Wenger 1991; Barton and Tusting 2005) we learn that everyone is not at the centre of things and has to be helped to come in from a peripheral positioning. This can be achieved according to these researchers with co-operation and lateral interactions, through the development of action-based and knowledge-based competencies with reflectivity at the centre. Along the same lines of thinking, Olson's (2003) model aims at achieving a 'meeting of minds' through the development of joint intentionality in the classroom context. Such a framework could prove to become operative, on a larger scale as well, around common concerns. He suggests that through on-going discussions around goal setting which eventually will lead to joint intentions, learners will embrace the same objectives, and in finding common ground, learning and communication will be facilitated.

Individual differences play a part and so does the person's education. Given the various complex aspects coming into play at the same time in such a course, there is a need for strategizing if one expects to achieve the necessary preparedness in future teachers. The necessary building blocks have to be put into place, getting the students to put effort into understanding, and other such ways of facilitating successful communication need to become the foundations on which to build a solid base.

FINDINGS

To the question: 'Are you looking forward to the New Grammar Approach' (Question 3), the answer was mostly "yes" or in one case "Yes" with a smiley face Emoticon : expressing emotion with typographical symbols (11/3/a). Another "Yes" (20/3/b) was underlined twice with the following addenda "it will be very difficult to implement, easier said than done" (20/3/a).

As regards numbers of participant answers, twenty out of twenty five felt positive about implementing the approach for example 2/3/b; 6/3/b; 8/3/b &c; 18/3/c; 21/3/b&c; 23/3/b… This is evidenced also by comments such as these: *a more interactive way* (2/3/a*), I believe it will be very useful* (3/3/a), *I am looking forward to understanding it more in depth and applying it* (4/3/a), *Personally, I think it is great for engaging the students* (11/3/c).
I like the [new] approach as it keeps French fun and most importantly useful while still enabling [the learners] to know grammar (22/3/c).

I like it because of the contextualization (13/3/c).

Many students had mixed feelings, with three of them showing a lack of understanding of this approach, the reasons for which could be varied (absence, traditional mind-set, low comprehensibility in French): no answer (19/3) ; *Assuming students will just pick it up is naive and in reality they just end up not knowing what they are talking about* (16/3); [there is a conflict] *in 'Core French teaching but in immersion, not so much* (10/3/b/c); *I think it depends on the program. For students with an extensive background in French, I would say that it works well* (10/3/c).

Six participants were very positive about the change but 12 identified significant conflicts in the schools.
22/3/a/b reflects the hesitation in the best way: [I am looking forward to the new grammar approach] *but with reservations as to its effectiveness with new learners*.

The new way to teach grammar in communicative contexts was somewhat in conflict with what 22 students observed in schools, but not too much of a conflict was reported.

It was applied but some elements of grammar were still taught: effective use of both [grammar approaches] (22/3/b). This was one student's opinion. This student was clearly still 'in-between' old and new curriculum guidelines, having a hard time with letting go of traditional ways of teaching. On the positive side, we can say that this student is open to an eclectic approach, and was opening-up to the new approach.

Another student comments: *It was "somewhat" in conflict with what I observed in schools* (12/3/b). However notes the same student, *One associate [teacher] focused on the Common European Framework [of reference].* Another participant identified an area of conflict resulting from the fact that *it is difficult for experienced teachers to change their teaching styles* (13/3/b).

In a similar way of thinking another student writes, *A lot of older teachers are hesitant to adapt this new method because of a lack of resources. However, there are some who are already using this method* (17/3/b). All in all, we identified that the development of professional judgment was in-line for most of the students towards a favorable "intake" of the new directives. We also witnessed that a small number of students were really set in their ways, with a strong mind-set and not open to a change of beliefs.

The 'Cultural Approach'

Given the importance in the world today of socio-cultural aspects, the need was felt to make students aware of socio-pragmatics and aspects of pragmalinguistics for French as a second language. It reflects a process of the accommodation and gradual integration of similar or different concepts shared by both cultures. Such concepts are impregnated with relations between language and culture which are also reflected in the relation between the form and the content of a language, its beliefs, values, and needs of both the learner and teacher. In line with this way of thinking the Ministry guidelines incorporate culture teaching across the new French second language curriculum. One question was related to cultural teaching with language described as the linguistic manifestation of human behavior and culture as patterned behavior to be learned through a familiarization of the achievements of its native speakers.

FINDINGS

20 out of 25 students were strongly in favour of the culture approach. Out of the five dissidents, one participant was undecided about the value of a cultural approach, another appeared not to have understood the concept underlying this new approach, as evidenced by the words, *sounds good, the more 'content-based learning', the better* (23/4/c).

Some conflict was felt and evidence in three comments *I hope the cultural content will be varied and not only focused on France* (1/4/b). In fact the Ministry document starts by advocating a knowledge of the local and regional French culture as every Canadian province is a home to groups of francophones, followed by provincial, national and only later international and world French cultures. It appears that this student might only have had access to texts on the culture of France and perhaps resents this fact.

Another example illustrates some resistance on the part of a local classroom teacher when a student practitioner attempted to integrate culture, *While teaching French , I felt like I had to rush through anything that wasn't grammar and I had to justify any cultural components* (14/4/b).

One similar comment was made by another student about teaching culture, who wrote, *It shouldn't always be left until last* (17/4/b).

Overall, because of the pupils' interest in the teaching of cultural content, the participants realized that there were fewer student behaviour problems than when just teaching aspects to due with the language.

CAN-DO: new perspectives on assessment

One concern is also over the definition of knowledge which needs to shift. Knowledge is usually to be seen in a French second language class as knowledge, skills and attitudes. Anderson presents the distinction between procedural (know how) and declarative knowledge (to know). However, we believe that beyond these categories there needs to be another one stated explicitly: showing in practice that you can apply the know how by adding to Bygate's (1987) "Skill getting and skill using" the intermediate stage of learning which entails comprehending how to apply for enhanced professionalization. Indeed "knowing how to" does not necessarily mean that you are able to perform, however in the teacher education programme this aspect is covered during practice teaching in school settings.

Performing tasks along a number of criterion referenced items is the advocated approach in order to certify that learners have acquired real life abilities.

FINDINGS

15 students expressed positive views on the Can-Do approach to assessment in statements such as the following; *it fits with differentiated teaching and learning styles* (3/5/c).

One student had mixed feelings and stated, *There are a lot of things students cannot do, but know. That's why it's so important to differentiate in your teaching and evaluation* (10/5/b).

It was understood as being a better strategy as evidenced by these words, *better for learning, worse for assessing/ordering students* (23/5).

Other participants, based on the following comments, were still grappling with this assessment notion, and wrote, *I just don't understand how to assess like this and how to make it fair* (6/5/c); *…not base it on what they can do, how will they ever get better*?" (7/5/b); *I find there is no challenge for students if the focus is on what they can do* (13/5/a*), It is very easy for the quality of the work being produced to slip below grade expectations* (20/5/b).

Nine participants did not understand or fully master the concepts involved as suggested by statements like the following, *This is an ok method for low-achieving students, but is a lot of work for the teacher to reach all students. I think it is unrealistic and disregards any learning/ achievement goals* (16/5).

These students were somewhat caught in the conflict between traditional ways of evaluating that they understood and were familiar with, and the needed change in mental representation tied to the new approach. What was in fact positive is that they were convinced that assessment had to be carried out well in order to measure learning. This concept is not at all in contradiction with the new perspective, yet somehow these participants appear to be quite demanding teachers with high expectations for their pupils which could be somewhat unexpected today because of the requirement of high grades for all students hoping to enter universities. These participants clearly gauged the importance of feedback to pupils and the connections between measurement and learning. They just did not quite understand that the Can-Do approach is by no means synonymous of slacking off. Perhaps the videos they were shown, samples of applications meant for summative assessment, filmed by the Ministry of Education, available at OMLTA.org could have given them that impression when looking only at incomplete examples.

DISCUSSION

The problem addressed here is how, in a teacher preparation course, to get the students to integrate the theoretical research sufficiently into or connect it, to personal practice for automatic or very readily available

use. This is necessary to get an idea of their state of preparedness. Since it is generally accepted among researchers that people do not act on what they think their beliefs and behaviours are (Zhao 2008; Myers 2009), in order to allow for exploration and interpretation of knowledge.

From the understanding of the literature we also gleaned the awareness of the need to search beyond the domain of action-knowledge when time is available. Because there is a distinction between awareness of tacit knowledge, there is a need to subject it to critical scrutiny and then one also has to be able to articulate it.

A number of contexts of "developing professionalization" were explored and presented through specific questions with findings and examples given.

It is necessary to understand that professional knowledge is not amenable to be encapsulated for representation in linear verbal expression. It is more in the domain of instant recognition, favouring an ability to read situations often bypassing words in order to be effective.

All in all 80% of the students showed an attitude open to change in all areas although they might initially been having difficulties with their early beliefs. In teacher preparation courses we usually are faced with students who already had some school placements, helping teachers in the field in a practical way but not having been taught the underlying concepts tied to their practice. It appeared that some of these students were resistant to "new" things as if in a way of saying "I already know it all", "I was in schools and the teacher let me teach", "I do not need to learn anything else".

Schön's (1983; 1987) distinction of tacit knowledge, "knowing in action" to "knowledge in action" is certainly of value to our investigation as we are addressing issues around "competence in performance" and but we are more interested in the "performance of competence" or competent implementation.

So what needs to be paid attention to?

1. Assess if the contents were reflected upon and theorized to varying degrees and with varying significance for current practice.
2. Assess the selection of public knowledge by the learning professionals from the wider base of public professional knowledge through encounter during their professional education and independent personal reading reflecting personal interest and experience by social interchange with fellow professionals and evaluate which portion of the above will have a significant chance to be used in practice.
3. Assess ways of integrating the theoretical knowledge sufficiently into and/or connect it to personal practice to make it automatic or very readily usable.

Very seldom and only when time is available are persons likely to search beyond the domain of action knowledge.

4. Check into what knowledge is used in a deliberate matter, justified and explained while other knowledge is more intuitive and only includes varying amounts of self-awareness.
5. More importantly assess personalization of professionalization, i.e., for each person identify the components of a certain public knowledge that is integrated into action-based knowledge by learning professionals showing the variation between the different levels of professionalization.

In training for professional programs it is crucial to re-transpose the theoretical knowledge and thus instructors have to require students to articulate it differently in context and be forced to make the effort to comprehend: this is key where new trends and innovations are concerned especially if these have to be fast-tracked, an inevitable situation in today's competitive world.

Implications for practice and policy

Developing professionalization is situated in areas of complex theory. How to assess or rather verify the future professionals' ways of articulating their competence in performance and understand it both from the level of "professionalization at work" and how it is interiorized in the person.

Perhaps the definition of professionalism has to be revisited. Inappropriate definitions still centre round Bernstein's (1971) ideology with social control of expertise. Rueschemeyer (1983) suggests it to have "relative freedom from interference based on unique expertise, moral integrity, confidentiality and protection from political abuse". Moreover in the past, inter-professional relations were generally absent except for the assertion of supremacy of the so-called true professions over the newcomers (Eraut 2001: 4). In our need for diversification, this attitude is no longer an option. Our future teachers were collaborating with classroom teachers during their field placements yet perhaps the experienced teachers, who were not always aware of the new trends in the field, did use their power over the teachers in training.

How is expertise acquired? It is crucial to develop professional knowledge and competence. In the multicultural multilingual Canadian society and in today's new knowledge economy, these have become acute problems, especially with teachers not prepared to teach the students in the new knowledge economy.

There is a responsibility in accountability of instructors of such courses to advance professionalism. So as regards learning professionals in training we are investigating how far transformation is possible. It is essential for young professionals to be able to articulate their distinctive knowledge base. Yet being able to do something in the field, while they are in front of a group of pupils, is the central requirement. Because of the added complexity communication in ever-changing methodological contexts entailed, continuous effort was required. This had to be imparted to the students in the university curriculum course through awareness raising mechanisms.

The research literature also shows that people do not know what they know or rather people have difficulty articulating that knowledge into propositional form. Perhaps using questionnaires similar to what was done in this study may make students more aware of their own internalization of know-how. It is clear that this should be carried out more often during the academic year, rather than wait till the year ends like what was the case in this investigation.

A number of researchers have looked at competence in performance through dialogue analysis which should be pursued and perhaps we will get around the problems around professional competence which are mixed in problems of truth, uncertainty and good judgment according to Kant.

CONCLUSION

We hope through this study to have contributed to future teachers of French understanding of professionalization at work. Our results were not conclusive regarding Olson's (2003) suggestions that discussions around goal setting will eventually lead to joint intentions, with the hope that learners will embrace the same objectives, and find common ground, thus facilitating learning and communication. This was observed among the students with many not fully subscribing to intended curriculum changes. They came to understand that they had to reckon with impacts of cultural influences on meaning-making, situational contexts and their own selves.

Moreover, and as mentioned earlier, each culture has its own unique individual behavioral pattern, linguistic or otherwise, so does teaching. However, learning a foreign language and culture will not necessarily mean changing the learner's behavior and injecting new ways and values of life into the already established behavior

pattern of the learner as indicated by Lado (1957; 1961: 110). The aim is to increase people's awareness and equip them with a better preparedness for the future.

All in all the future teachers participating in this study demonstrated a readiness to the changes as advocated by the Ministry of Education of Ontario. The new grammar approach avoids the situation of students only doing grammar exercises during class without speaking a word of French. Culture learning is in order for an increase in learner motivation and to increase one's awareness of difference as well as an attempt to become more accepting. Hence the cultural approach is key. 'Can-Do' as the advocated assessment strategy is in line with McNamara and McNamara's (1996) and the European Union (1996) scales and in addition, in schools, emphasizes the importance of autonomous learning and of taking charge, both crucial for lifelong learning. These are some of the parameters underlying course delivery under the new Ministry curriculum guidelines.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 03 ISSN 1309-6249

A STUDY ON CURRICULUM STRUCTURE AND INDUSTRY REQUIREMENT OF DESIGN EDUCATION IN TAIWAN

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ABSTRACT

The purpose of this study is to explore practical courses that conform to industrial design, visual communication design and multimedia design. The methodology includes literature review, DACUM and interview for each design realm. The research results are as follows: (1)Industrial design: through analyzing existing courses and investigating design industry, then planning industrial design courses and amending the curriculum structure into four programs, which are including design technology program, design creation program, culture invention program and digital application program. Further, to cultivate students' secondary specialty, encourage them to participate design competition and apply for patent. (2) Visual communication design: courses can be divided into three aspects which contain nine categories. Cognition aspect includes knowledge of professional, marketing, and technological; Sentiments aspect includes design thinking, art culture, and pre-professional planning; technique aspect includes basic design, integrated design, and digital design. And the future courses are recommended to intensify marketing and technological knowledge. (3)Multimedia design: courses can be divided into three aspects which contain seven categories. Cognition aspect includes humane cultivation, basic knowledge, and professional knowledge; sentiments aspect includes attitude and value judgment; technique aspect includes basic and advanced skill. The needs of digital design industry are information software system, marketing planning and project management, art and communication designs, business sales, and script writing.

Key Words: Design Education in Taiwan, Design Industry, Curriculum Structure.

INTRODUCTION

In recent years, the Taiwan government has given every effort to encourage the development of culture and creative industry and aggressively promoted major policies, such as "Manpower Overall Cultivation and Application Plan" and "Program for Promoting Teaching Excellence of Universities", in order to reduce the gap between university education and job market, and enable higher education system to provide the human resources meeting the demand of industrial upgrade and development. (Ministry Of Education, 2006). In terms of technical and vocational colleges of higher education system, the objective of design education is to cultivate professional designers to engage in design industry, and bring their personal design expertise into full play, in

order to increase the vitality of design industry and enhance national competitiveness.(Chu, Yuan-Hsiang, 2001).

The 21st century is the era of knowledge economy, as well as the rise of digital era. Therefore, to facilitate the subsequent development of traditional industry and to enhance its knowledge content, the combination of cultural and creative thinking with digital technology and their application are imperative in current industrial trend. In recent years, the promotion of culture and creative industry has been the focus in Taiwan. Consequently, culture and creative industry, digital industry, and knowledge economy industry should be closely combined to put into practice the development of knowledge economy in Taiwan and to enhance national competitiveness. (Council for Cultural Affairs, 2004). In terms of the development of design industry, since the 1990s, many English-speaking countries, North European Countries, and Asia's newly industrialized countries have aggressively developed "**Design industry**." Although various countries around the world define the developmental scope according to "industries," the contents of industries are not exactly the same. (Cunningham, 2001) . Moreover, with the rapid development of design technology, design capability, methods, and techniques have transformed. Therefore, a constant appeal has been made that design education should re-reflect on and amend design curriculum to cultivate students' new abilities. Moreover, teachers' teaching methods and abilities should also be increased to respond to the changes in time. (Manzini, 2009; Reimer & Douglas, 2003).

Consequently, human resource cultivation plays an indispensable role in design education if a country intends to trigger the development of its design industry to international level. The cultivation of design professionals is subject to the educational environment of design, and the factors affecting it include the predetermined direction and specific objectives of various design departments and curriculum structure, curriculum content, and curriculum process of school, which all affect students' professional knowledge and skills and further affect the human resource cultivation as required by industries. However, design field is the technical and vocational training of technological integration, and its curriculum scope includes fields such as society, humanity, nature, economy, and engineering technology. As a result, practical techniques and skills are crucial knowledge fields in education training of higher education technical and vocational colleges. Therefore, it is important to understand industrial needs, design the curriculum meeting industrial needs, and cultivate human resources meeting industrial needs.

The purpose of this study is to explore practical courses that conform to industrial design, visual communication design and multimedia design, and the industry requirement. The main purpose of this study is to understand the framework of current practical curriculum and current status of teaching of three departments, as well as the manpower and capacity needs for design personnel cultivated by them, in order to propose the amendments and suggestions on the curriculum of human resource cultivation meeting industrial needs.

METHOD

Firstly, this study investigated and analyzed the current status of curriculum planning of departments of industrial design, visual communication design, and multimedia design. This study used the educational objectives of Affective, Cognitive, and Skill proposed by Bloom (1956) as the main aspects for curriculum classification. Moreover, this study used the DACUM analysis developed by senior teachers to understand the curriculum planning and characteristics of various design-related departments in various schools. Secondly, this study used data mining techniques to collect data from the job seeking database of various design industries of "104 Job Bank." The job seeking database was the main source of samples. This study analyzed the "manpower" and "capacity" needs of various fields of design industry and used expert in-depth interviews to investigate and analyze the supervisors and experts of design industry. Lastly, this study conducted a

comprehensive analysis on the data mentioned above as the basis for curriculum planning and amendment (Figure 1).

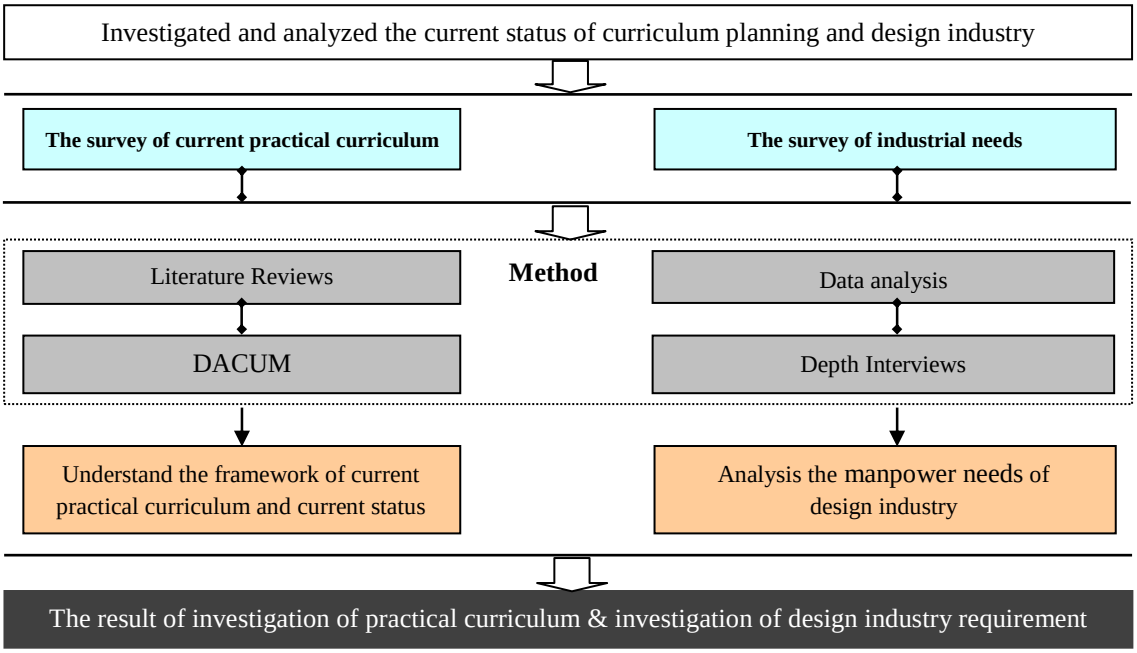

Figure 1: Research procedure

FINDINGS

1. The result of investigation of practical curriculum

Industrial design

The result of the investigation on current status of practical curriculum showed that, on average, the courses of cognition aspect were more frequently (50.96%) arranged in the curriculum structure of department of industrial design in 13 schools in Taiwan, and their main objective is to develop design concepts. However, the courses of affection (17.71%) and skill aspects (31.33%) were relatively fewer. The result is inconsistent with that obtained from the latter investigation on capacity needs in industry. It could be inferred that school education failed to meet industrial needs and should be improved (Table 1).

Table 1: The proportion analysis of the courses aspect for Industrial design

	School	Cognition aspects	%	Affection aspects	%	Skill aspects	%
1	National Taiwan University of Science and Technology, Taipei, Taiwan	24	41%	19	32%	16	27%
2	National Taipei University of Technology, Taipei, Taiwan	28	47%	8	14%	23	39%
3	National Yunlin University of Science and Technology, Yunlin, Taiwan	44	74%	8	14%	7	12%
4	National Cheng Kung University, Tainan, Taiwan	15	45%	7	21%	11	34%
5	National United University	62	57%	13	12%	33	31%

6	National Kaohsiung Normal University, Kaohsiung, Taiwan	21	34%	11	18%	29	48%
7	Ming Chi University of Technology, New Taipei City, Taiwan	19	46%	7	17%	15	37%
8	Chaoyang University of Technology, Taichung, Taiwan	29	43%	10	15%	29	42%
9	Huafan University, New Taipei City, Taiwan	46	64%	11	15%	15	21%
10	Da Yeh University, Changhua Taiwan	52	62%	25	29%	8	09%
11	Tatung University, Taipei, Taiwan	26	46%	6	11%	24	43%
12	Chang Gung University, Tao-Yuan,Taiwan	32	59%	7	13%	15	28%
13	Tunghai University, Taichung , Taiwan	24	43%	7	12 %	25	45%

Visual communication design

In terms of the curriculum structure of department of visual communication design of 11 schools in Taiwan, according to the data collected from curriculum and the suggestions and definition provided by the in-depth interviews with four experts, the current curriculum can be divided into "three aspects and nine categories," including professional knowledge, marketing knowledge, and technical knowledge of "cognition aspect," design thinking, artistic culture, and pre-occupational planning of "affection aspect," and fundamental design, integration design, and digital design of "skill aspect." (Table 2).

Table 2: The proportion analysis of the courses aspect for Visual communication design

	School	Cognition aspects	%	Affection aspects	%	Skill aspects	%
1	National Taiwan University of Arts, New Taipei City, Taiwan	10	20%	6	11%	35	69%
2	Da Yeh University, Changhua, Taiwan	7	18%	9	23%	23	59%
3	Asia University, Taichung, Taiwan	7	14%	9	19%	32	67%
4	National Yunlin University of Science and Technology, Yunlin, Taiwan	16	22%	23	32%	33	46%
5	Kun Shan University, Tainan, Taiwan	11	24%	15	33%	20	43%
6	Southern Taiwan University, Tainan, Taiwan	5	11%	8	17%	34	72%
7	Shu-Te University, Kaohsiung, Taiwan	11	21%	12	23%	30	56%
8	China University of Technology, Hsinchu, Taiwan	9	21%	7	17%	26	62%
9	Ling Tung University, Taichung, Taiwan	12	21%	10	18%	34	61%
10	JinWen University of Science & Technology, New Taipei City, Taiwan.	7	13%	10	18%	38	69%
11	Asia-Pacific Institute of Creativity, Miaoli, Taiwan	10	26%	8	20%	21	54%

Multimedia design

As for the curriculum structure of department of multimedia design of 16 schools in Taiwan, according to the data collected from curriculum and the DACUM meeting held by 6 senior teachers, the curriculum could be divided into three aspects and 7 categories, including humanity attainment, fundamental professional knowledge, and fundamental field knowledge of "cognition aspect," attitude and value judgment of "affection

aspect," and fundamental professional skill and advanced professional skill of "skill aspect." Moreover, core departments developed their core curriculum according to their futuristic developmental characteristics. (Table 3).

Table 3: The proportion analysis of the courses aspect for Multimedia design

	School	Cognition aspects	%	Affection aspects	%	Skill aspects	%
1	Takming University of Science and Technology, Taipei, Taiwan	5	10%	0	0%	44	90%
2	National Yunlin University of Science and Technology, Yunlin, Taiwan	11	15%	5	7%	57	78%
3	Ling Tung University, Taichung, Taiwan	13	18%	0	0%	58	82%
4	Far East University, Tainan, Taiwan	10	17%	1	2%	47	81%
5	National Formosa University, Yunlin, Taiwan	24	38%	0	0%	40	62%
6	Chienkuo Technology University, Changhua, Taiwan	7	13%	1	2%	48	85%
7	China University of Technology, Hsinchu, Taiwan	7	25%	0	0%	21	75%
8	Tajen University, Pingtung, Taiwan	18	27%	2	3%	46	70%
9	Asia-Pacific Institute of Creativity, Miaoli, Taiwan	18	22%	3	4%	60	74%
10	Chihlee Institute of Technology, New Taipei City, Taiwan	20	32%	3	5%	40	63%
11	Hwa Hsia Institute of Technology, Taipei, Taiwan	17	23%	1	1%	57	76%
12	Hsiuping University of Science and Technology, Taichung, Taiwan	16	26%	2	3%	44	71%
13	Tatung Institute of Commerce and Technology, Chiayi, Taiwan	4	11%	0	0%	33	89%
14	Fortune Institute of Technology, Kaohsiung, Taiwan	18	28%	2	3%	44	69%
15	Kao Fong College of Digital Contents, Pingtung, Taiwan	16	25%	1	2%	47	73%
16	National Taichung University of Science and Technology	27	46%	1	2%	31	52%

2. The analysis of investigation of design industry requirement

At current stage, this study mainly selected samples from the job seeking database of "104 Job Bank" in Taiwan. This study used data mining to analyze the manpower needs of design industry. Moreover, this study also used expert interviews to further analyze the graduates, supervisors, and experts of industries of industrial design, visual communication design, and multimedia design.

The results of Industrial design requirements

According to the job titles of graduates from department of industrial design in the past, there were 20 job titles totally, including product marketing personnel, industrial designer, product after-scale technical service, marketing planning personnel, product design and development personnel, project business executive, product maintenance personnel, director of project management, market research analysts, activity planning

personnel, marketing planning assistant, design assistant, trademark/patent personnel, computer graphic designer, product planning director, director of marketing planning, junior high school teacher, exhibition window layout personnel, elementary school teacher, and art teacher. The job titles were randomly selected, and 200 job vacancies for each job title were found in the record within the recent three years. Only the job vacancies of elementary school teacher (66) and art teacher (51) are fewer than 200. The results showed that product marketing personnel were in the highest demand (267), followed by industrial designers (242). (Table 4).

Table 4: The results of Industrial design requirements

	Level	Job Category	Number of people
1	high-level manpower	director of project management	267
2		project business executive	242
3		director of marketing planning	227
4		product planning director	224
5	middle-level manpower	product design and development personnel	221
6		industrial designer	221
7		product marketing personnel	221
8		product maintenance personnel	215
9		activity planning personnel	214
10		computer graphic designer	208
11		marketing planning personnel	207
12		trademark/patent personnel	198
13		market research analysts	196
14		exhibition window layout personnel	195
15		product after-scale technical service	193
16	primary manpower	marketing planning assistant	192
17		design assistant	189
18	other	junior high school teacher	188
19		elementary school teache	64
20		art teacher	59

The results of Visual communication design requirements

According to the job titles of graduates from department of visual communication design in the past, in terms of high-level manpower, directors of advertising planning were in the highest demand (226), while directors of multimedia development were in the lowest demand. As for middle-level manpower, the manpower need (276) in entertainment business was the highest, while that in packaging design was the lowest (142). As for primary manpower, design assistants (207) were in the highest demand, while program assistants (52) were in the lowest demand. The capacity needs of high-level manpower included good marketing concept, good communication ability, good management leadership, good planning ability, and proactive, aggressive, and passionate learning attitude. The capacity needs of middle-level personnel included proactive, aggressive, and passionate learning attitude, good working attitude, good communication attitude, good problem-solving ability, ability to use Photoshop, strong sense of responsibility, good planning ability, and good editing and typesetting abilities. The capacity needs of primary manpower included aggressive learning attitude, good working attitude, good communication ability, strong sense of responsibility, basic ability to operate office software, and good recording/filming ability. (Table 5).

Table 5:The results of Visual communication design requirements

	Level	Job Category	Number of people
1	high-level manpower	director of marketing planning	192
2		director of Media campaigns	196
3		directors of advertising planning	226
4		directors of multimedia development	120
5		Art Direction	188
6	middle-level manpower	advertising designer	206
7		art designer	200
8		commercial designer	191
9		packaging designer	142
10		multimedia animation designer	212
11		web designer	202
12		graphic designer	200
13		computer graphic designer	195
14		Film production and technical personnel	221
15		photographer	227
16		text workers	215
17		typesetters	193
18		advertising Planning	194
19		media planning	189
20		publishing	205
21		exhibition window layout personnel	188
22		entertainment business	276
23	primary manpower	design assistant	207
24		marketing planning assistant	198
25		Program assistant	52
26		photographer's assistant	125

The results of Multimedia design requirements

According to the job titles of graduates from design-related departments, such as visual design and information design, there were a total of 15 main job titles in the job seeking database. However, only five major categories were relevant to multimedia design, including the category of information software system, category of marketing/planning/project management, category of communication art design, category of business marketing, and category of paper work. This study used data mining technique to analyze 200 jobs of each category. From 2006 to 2008, the manpower need within 3 years in the category of communication art design was the highest (2,093 totally). The top three popular jobs were photographer, video production technicians, and multimedia animation designers. The manpower need in the category of marketing/planning/project management was in the second place (1,343 totally). The top three popular jobs were website marketing planning personnel, marketing planning personnel, and activity planning personnel. (Table 6). The analysis on manpower and capacity needs showed that the manpower need of primary manpower included information assistants, marketing planning assistants, business assistants, and design assistants. The manpower need of middle-level manpower included 21 jobs such as internet program designers, video game program designers, activity planning personnel, website marketing planning personnel, advertisement/planning personnel, communication media planning personnel, advertisement designer, multimedia animation designers, website designers, computer graphics designers, film production technicians, and photographers. The capacity needs of them included professional attitude, value judgment, professional knowledge, understanding, and application,

and professional skills. The manpower need of high-level manpower was mainly directors, including directors of marketing planning, directors of internet marketing planning, artistic directors of multimedia animation, etc.

Table 6: The results of Multimedia design requirements

	Level	Job Category	Number of people
1	high-level manpower	director of marketing planning	192
2		director of web marketing planning	220
3		directors of multimedia	174
5	middle-level manpower	Internet Programmers	171
6		Game programmers	215
7		marketing planning personnel	199
8		activity planning personnel	192
9		web marketing planning	207
10		Advertising Planning	187
11		Advertising staff	238
12		Publishing	183
13		media planning	186
14		advertising design	206
15		exhibition window layout personnel	163
16		Multimedia animation designer	211
17		Graphic designer	199
18		Web designer	197
19		art designer	199
20		computer graphic designer	175
21		Program production	134
22		Video Production Technology	219
23		photographer	227
24		typesetters	191
25		other media work	81
26	primary manpower	Information Assistant	189
27		marketing planning assistant	189
28		Operations Assistant	156
29		design assistant	163

DISCUSSION AND CONCLUSION

1. Current Status of Practical Curriculum of Department of Design

The characteristics of curriculum planning of department of industrial design included: the curriculum planning met the 16 needs of industries and it integrated 4 programs (program of design technology, program of design creation, program of cultural creation, and program of digital application) to cultivate students' second expertise, to increase their future workplace competitiveness, to make them aggressively participate in design competitions and patent application, and to increase their confidence and creativity, and it put into practice the system of practical training. Such a curriculum enabled students to test and verify wheat they had learnt and get in touch with industries as early as possible. In addition, they could understand what they were deficient in and made up the deficiency through the practical training.

The characteristics of the curriculum planning of department of visual communication were summarized as follows: current curriculum planning of relevant departments in Taiwan focused on the cultivation of skill

aspect and ignored the courses of marketing knowledge and technical knowledge in cognition aspect. However, the results of expert interview and literature analysis showed that marketing knowledge and technical knowledge were the design transformations required to be faced by department of visual communication design in the future. The effect of internet technology on the change in market was the strongest and micro-market and home economy both significantly affected the marketing and design directions of design industry. Moreover, marketing knowledge was in demand in high-level, middle-level, and primary manpower industries. Therefore, it is advised to add the courses of marketing knowledge and technical knowledge in cognition aspect, in addition to the course in skill aspect, into the curriculum planning of visual communication design. As for the cultivation of affection aspect, it is necessary to strengthen students' proactive and aggressive learning attitude and narrative ability, namely, the ability to present a briefing and communicate with people.

Both the framework and course contents of the curriculum of department of multimedia design would affect the cultivation and training of students. The literature analysis found that relevant curriculum in Taiwan seldom used the three major fields of educational objectives as the core of curriculum planning, which resulted in the unbalanced curriculum aspects and affected the learning development of students. In terms of the design of multimedia, the curriculum aspects were mainly skill-oriented, which resulted in the unbalanced curriculum distribution, inconsistency in the names of courses of fundamental skills and students' failure to identity what they have learnt from course contents. Therefore, it is necessary to return to the three major educational objectives of cognition, affection, and skills as the core properties of the curriculum to develop students' fundamental professional knowledge and skills. Other innovative and developmental courses can be designed and developed according to the characteristics of departments.

2. Manpower and Capacity Needs of Design-related Industries

In terms of the categories of companies and industries where designers work, the manpower from department of industrial design in the category of daily commodity design (37) was in the highest demand, followed by 3C products (31), household appliances products (27), and transportation tools (23). In terms of capacity need, creative thinking (4.78) was in the highest demand, followed by design expression (4.67), aesthetic literacy (4.66), product design (4.65), and modeling ability (4.62).

The results of the manpower and capacity needs from department of visual communication design showed that, the graduates from department of visual communication design mainly served as middle-level and primary manpower after engaging in industries. The investigation on the manpower and capacity needs from department of visual communication design in industries showed that middle-level manpower was in the highest demand, followed by high-level manpower and primary manpower. Therefore, the education of visual communication design at college stage should encourage students' balanced development of various abilities.

The results of the manpower and capacity needs from department of multimedia design showed that the manpower need in the category of communication art design was the highest, including photographers, film production technicians, and multimedia animation designers. In terms of capacity needs, it could be generally divided into 5 aspects, affection, cognition, skill, experience, and company/industry-oriented aspect. Among them, two aspects, experience and company/industry-oriented aspects, were consistent with the characteristics of curriculum structure. One of them was the extension of department characteristics, while the other was the company business-oriented need.

This study suggested that the cultivation of cognition can improve mutual communication and coordination, affection can cultivate students' attitude, and skill is the fundamental ability of operation. Design-related educators should focus on developing the most fundamental education for students. It was hoped that the follow-up studies can put into practice the industry-oriented learning training and technical application to amend the structure of current educational curriculum, to cultivate talents with technical practice experiences for industries, and improve the quality of design education, in order to enable students to increase their career

development opportunities, bring their design talents into full play, and achieve the educational objectives of design and meet manpower needs of industries.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 04 ISSN 1309-6249

THE COMPARATIVE ANALYSIS OF REGULARIZATION METHODS APPLICATION FOR THE PROCESSING OF INCOSISTENT EXPERT EVALUATIONS IN EDUCATION

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ABSTRACT

Present paper is focused on the study of stability issues for some "traditional" models aimed at analysis of expert evaluations. It is demonstrated that estimation of the complex indicator true value for each student in the space of characteristics is dependent on the stable inverted transformation of the initial data matrix, and which is commonly regarded to be an ill-conditioned matrix: for obtaining of regularized solution it is considered a classical Tikhonov regularization method applying the traditional approaches to the optimal regularization parameter selection. There are shown the shortcomings of those traditional approaches, and proposed a principal new approach to determination of optimal regularization parameter. For finding the residual (as well as for the obtained optimal regularization parameter) between the normal pseudosolution and solution based on the developed method there are obtained the upper estimates, and based on the obtained evaluation it is proved both convergence property of the found regularized solution to the normal pseudosolution and the fact that proposed method is inducing the Tikhonov regularizing operator.

Key Words: Mathematical model, expert assessments, objectivity, coherence, Tikhonov regularization method, normal pseudosolution, regularized solution.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 04 ISSN 1309-6249

INTRODUCTION

One of the major problems in analyzing experts' data that require quantitative assessment methods is the problem of adequate mathematical tools (models and methods) selection for the expression of experts' opinions and further processing of the information obtained on the basis of operator-algebraic and/or statistical approaches. The purpose of these diverse studies is to determine the objectivity of experts' evaluations at the decision-making process and while constructing the integral indicators. In fact, an objective analysis of the environmental, economic, socio-political and socio-psychological, educational, sports, etc. systems depends on the overall address of the problem – the problem of determining the objectivity of experts' evaluation. Currently, there are a lot of models, approaches and methods for planning expert opinion polls, as well as collecting, processing and analysis of experts' opinions. If to omit the details relevant to the existing models and methods, they can be conventionally regrouped into two "larger" classes: 1) probabilistic-statistical-parametric models, including a probability of various assumptions (e.g., the assumption of normality of the experts assessments distribution), which actually are not sufficiently justified, 2) operator (linear or non-linear) deterministic models, which, first, are unstable (i.e. have an increased sensitivity degree of their solutions to the possible perturbations of initial data, even to arbitrarily small ones) and, secondly, are not enough algorithmized. More information about these two classes of models and methods of experts' evaluations analysis can be obtained from, for example, (van der Linden & Hambleton, 1997; Neiman & Hlebnikov; Litvak & Tyurin, 1979; Zagoruyko, 2002; Cherepanov, 1989), in which there is a vast bibliography on this subject. Main generality of mathematical models of these two classes is rooted in two aspects on which basis mathematical models are constructed:

- *The concept of experts' opinions consistency*, when a feasible solution, including the optimal solution, madeon the basis of correlated experts' opinion, i.e. there are excluded / declined from the panel of experts those experts whose views differ from the opinions of most experts in the commission. As it has been justified in (Guseynov & Berezhnoy, 2011), this approach to the acceptance of a feasible (even optimal) solution, when there are not taken into account sharply contrasting expert opinions/evaluations can lead to distortion of the final expertise assessment, where a measure of distortion remains unvalued and, moreover, there also remains unexplored the potential impact of this measure on the final assessment of examination. Consequently, this approach does not allow reducing the influence of distorted expert assessments on the final solution of decision-maker (DM);
- *The concept of "pursuit of experts' representativeness of experts"*, when the numerical assessments (that also may be fractional) are brought together without regard to the consistency of expert' opinion. As it has been proved in (Guseynov & Berezhnoy, 2011), this approach is not allowing to minimize the impact of biased (either due to the lack of qualifications of the experts or intentionally distorted) expert assessments.

Therefore, there is a need to construct a mathematical model that would allow minimizing the consequences of the lack of "traditional" models, based on the abovementioned two concepts. In (Guseynov & Berezhnoy, 2011), by the authors of this paper there was constructed the mathematical model for the analysis of expert information in order to determine the true ratings of the students (students or secondary school scholars) on the assembly of experts' evaluations. In this paper it is investigated the stability of some "traditional" models for analysis of expert' assessments. There are considered and analyzed traditional approaches to selection of the optimal regularization parameter in Tikhonov regularization method; there are identified its major shortcomings, and there is proposed a radically new approach for choosing the optimal or quasi-optimal regularization parameter.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 04 ISSN 1309-6249

QUALITATIVE AND MATHEMATICAL MODELS OF THE CONSIDERED PROBLEM

Generation of data

Let us assume that there are m students $\{s_1, s_2, ..., s_m\} \overset{def}{\equiv} S$, which are evaluated using n base characteristics / indicators / attributes $\{c_1, c_2, ..., c_n\} \overset{def}{\equiv} C$. Let us suppose that each of the students $s_i \ \left(i = \overline{1,m}\right)$ is somehow evaluated / "measured" using quantitative characteristics $\{a_{i,1}, a_{i,2}, ..., a_{i,n}\} \overset{def}{\equiv} A_{i\cdot}$, i.e. there exists an initial data matrix $\left\{a_{i,j}\right\}_{i=\overline{1,m}}^{j=\overline{1,n}} \overset{def}{\equiv} A \in \mathbb{R}^{m \times n}$, which will be called an estimation-identification matrix. In that way, $a_{i,j}$ element of the calculation-identification matrix A means value of the $j-$th $\left(j = \overline{1,n}\right)$ characteristic / attribute $c_j \in C$ $i-$th $\left(i = \overline{1,m}\right)$ of the student $s_i \in S$. In other words, a row-vector $A_{i\cdot} \in \mathbb{R}^n$ of the estimation-identification matrix A describes $i-$th student $s_i \in S$, and a column-vector $A_{\cdot j} \overset{def}{\equiv} \{a_{1,j}, a_{2,j}, ..., a_{m,j}\} \in \mathbb{R}^m$ of the estimation-identification matrix A contains assessments of the $j-$th characteristic / attribute $c_j \in C$ for all the students S evaluated by experts.

Construction of the integral indicator

Let us assume that each student $s_i \in S$ is attributed to the integrated indicator (integrated indicator is a convolution of data that compiled using special methods, which is the most informative to disclose a student in the space of characteristics / indicators / attributes; to obtain an exhaustive knowledge on integral indicators it is possible to refer to, for example, (Shakin, 1972; Ayvazyan, 2000; Hagerty et al., 2001; Ayvazyan & Mhitaryan, 1998; Borodkin & Ayvazyan, 2006; Orlov, 1996), where various methods are considered – "supervised" or "unsupervised" – in order to compile and calculate values of integral indicators; to understand the "inomnipotence" of integral indicators usage can be accessed, for example, in (Ayvazyan & Isakin, 2006; Strizhov, 2011)

$$I_i \overset{def}{\equiv} \sum_{j=1}^{n} w_j \cdot f_j^{Uniform\_scale}\left(a_{i,j}\right) \in \mathbb{R}^1, \quad \left(\forall i = \overline{1,m}\right) \tag{1}$$

where $w_j \in \mathbb{R}^1 \ \left(j = \overline{1,n}\right)$ is weight / importance of the $j-$th $\left(j = \overline{1,n}\right)$ characteristic / indicator / attribute $c_j \ \left(j = \overline{1,n}\right)$; function $f_j^{Uniform\_scale}\left(a_{i,j}\right)$ is a function of reduction of characteristics / indicators / attributes into the single scale, and is defined as

$$f_j^{Uniform\_scale} : a_{i,j} \mapsto (-1)^{Modifier_j} \cdot \frac{a_{i,j} - \min\limits_{i=\overline{1,m}}\{a_{i,j}\}}{\max\limits_{i=\overline{1,m}}\{a_{i,j}\} - \min\limits_{i=\overline{1,m}}\{a_{i,j}\}} + Modifier_j; \tag{2}$$

numerical parameter $Modifier_j$ is a modifier of single scale, and is determined as

$$Modifier_j = \begin{cases} 1, & if \quad \underset{i=\overline{1,m}}{optimal}\{a_{i,j}\} = \min\limits_{i=\overline{1,m}}\{a_{i,j}\}, \\ 0, & if \quad \underset{i=\overline{1,m}}{optimal}\{a_{i,j}\} = \min\limits_{i=\overline{1,m}}\{a_{i,j}\}. \end{cases} \tag{3}$$

Note the following property, which may take place in the expression (2): for some indices $\overline{j} \in \{1, ..., n\}$ the denominator of fraction (2) may be zero, and in this case, the corresponding characteristics $c_{\overline{j}} \in C$ (hence, the values of this characteristic $a_{i,\overline{j}} \in A_{\cdot\overline{j}}$, i.e. items) are excluded from the further consideration.

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Further, from (1)-(3) there are calculated integral indicators (the methods for finding the valuesof integral indicators will be discussed later), and it is necessary to satisfy in some way the condition of compatibility of various integral indicators found for various students normalizing the general characteristics. To do this, the maximum and minimum possible values of each characteristic are set for the whole manifold of S students, and the optimal value of this characteristic is assigned. Then it becomes possible to rank the students: the best one is the student who possesses all characteristics having optimal values; the worst is the student who possesses all characteristics having worst values; characteristics of other students will be distributed (after applying the valuation map to characteristics) on the scale between the integral indicators of the best and the worst students, thus, providing the possibility to compare students with each other: (a) student $s_{\bar{i}} \in S$, which has the maximal value of integral indicator $I_{\bar{i}} = \max\limits_{i=\overline{1,m}} \{I_i\}$, is regarded to be the best; (b) student $s_{\bar{\bar{i}}} \in S$, which has the minimal value of integral indicator $I_{\bar{\bar{i}}} = \min\limits_{i=\overline{1,m}} \{I_i\}$, is regarded to be the worst; (c) characteristic / indicator / attribute $c_{\bar{i}} \in C$, which has a maximal value of weight $w_{\bar{i}}$, is the most significant while finding the integral indicator; (d) characteristic / indicator / attribute $c_{\bar{\bar{i}}} \in C$, which has minimal value of weight $w_{\bar{\bar{i}}}$, is the least important while finding the integral indicator.

Thus, (1)-(3) gives us vector-integral indicators of the manifold S, which is expressed in the form of operator equation

$$I = AW, \tag{4}$$

where $I \overset{def}{\equiv} \{I_1,...,I_m\} \in \mathbb{R}^m$; $W \overset{def}{\equiv} \{w_1,...,w_n\} \in \mathbb{R}^n$ is a manifold of significance / weights of characteristics/ indicators / attributes C.

Obviously, in order to determine the values of integral indicator I, subordinated to the equation (4), as the first step it is required to find somehow significance / weights of all indicators. In order to do this there exist various methods, which are divided (for instance, see (Ayvazyan, 2000; Ayvazyan & Mhitaryan, 1998; Borodkin & Ayvazyan, 2006; Orlov,1996; Strizhov, 2011) and respective references given in these) into "supervised" and "unsupervised" methods. Among these methods of both types there should be mentioned the following well-researched methods: metric method (finding the distance), principal components analysis, Pareto stratification method, weighted sum method, singular decomposition method, expert-statistical method, method of expert' evaluations correction in the linear scales, method of experts' evaluations in the ranked scales. In this work we will use the last of these methods – the method of correction of experts' evaluations in the ranked scales. A short essence of this method is as follows: experts put the grades of quality characteristics / indicators to students, as well as evaluate the significance of these characteristics / indicators in the ranked scale, suggesting the ratings linear order is assigned to the assessment multifold (thus, this approach is clearly based on ideas of experts' evaluations correction method in the linear scales); then the experts are given opportunity to evaluate the weights of general characteristics and integral indicators of students; one of the main tasks of experts is to identify contradictions / adjust differences between the integral indicators, weights of characteristics / indicators, weights of characteristics / indicators of students and the measured data of the students (such a contradiction arises if integral indicators are not consistent, which requires a special procedure). Some information about experts: the role of expert evaluation is quite essential for the considered problem, namely, let us assume that experts are setting the criteria by which students are assessed; students are clustered by experts based on these criteria; experts put grades to each of the students. Experts should comply with requirement that each expert should have his/her own professional opinion (not only based on the calculated / measured data but based on the personal experience and knowledge acquired prior to and in the process of work), not imposed by public opinion; experts should be free in their actions (for example, working with a special questionnaires; expressing their opinion in those questionnaires; putting comments to those questionnaires; etc.), in their utterances, etc.

International Journal on New Trends in Education and Their Implications
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Thus, the result of operation of one expert is a triple (I_{ex}, W_{ex}, A). It should be noted that if there is a group of experts evaluating the quality characteristics / indicators of students and the weights of these characteristics/ indicators in the ranked scales, then they should be reduced to the agreed form, for example, by calculating the Kemeny median (for instance, see (Litvak, 1981), as well as (Guseynov & Berezhnoy, 2011)). The consistent values of integral indicators and weights of characteristics / indicators / attributes are such vectors I^* and W^* that satisfy stated conditions

$$I^* = AW^*; \quad W^* = A^{-1}I^*, \tag{5}$$

where with A^{-1} is denoted the operator inverse to A (in our case finite-dimensional, i.e. A is a matrix, however all the following statements remain fair in the case, when A operator is infinite-dimensional linearly bounded operator, for example, linear completely continuous operator, which has following properties $A^{-1}AA = A$, $A^{-1}AA^{-1} = A^{-1}$, $\left(A^{-1}A\right)^T = A^{-1}A$, $\left(AA^{-1}\right)^T = AA^{-1}$; I^* represent expert quality evaluations of students; W^* represent expert evaluations of students characteristics / indicators weights.

Remark 1. *As it has been already mentioned earlier in this section, in order to estimate weights / importance of the students' characteristics / indicators we use the experts' evaluations correction method in the ranked scales. However, it should be noted that the same conditions (5) (of course, in various interpretations and meanings) arise also in the application of principal components method, singular decomposition method, weighted sum method, expert-statistical method, as well as experts' evaluation correction method in the linear scales. Therefore, for the development and study of a regularizing algorithm, which will be discussed in next section of this paper, the obtained results are correct, if in order to assess students' characteristics / indicators weights there will be applied one of the above listed methods instead of the experts' evaluations correction method in ranked scales.*

CONSTRUCTION OF THE REGULARIZING ALGORITHM FOR THE STABLE INVERTED TRANSFORMATION OF THE INITIAL DATA MATRIX

Classical approach and arising problems

Let us consider the equation (5), where it is necessary to invert estimation-identification matrix A: $W^* = A^{-1}I^*$. As a rule the estimation-identification matrix A is an ill-conditioned matrix, hence, the inverse matrix A^{-1} doesn't exist in its classical meaning, i.e. the problem of finding weight evaluations for the students characteristics / indicators is becoming an ill-posed problem (for instance, see (Engl & Neubauer, 1985; Bauer & Lukas, 2011; Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001; Sizikov, 2003; Ramm, 2005; Morozov, 1984; Verlan & Sizikov, 1986)): even small perturbation of experts' evaluation vector causes the substantial change of integral indicators vector. Therefore, there arises the problem of its stable inverse transformation (not finding of its pseudoinversion: the most widely known type of matrix pseudoinverse is the Moore-Penrose pseudoinverse. However this method appears to be incapable while inverting the estimation-identification matrix A) it is necessary to develop special methods that are using mathematical toolset of the theory of ill-posed problems. This issue becomes even more acute and complex when elements of the estimation-identification matrix A are characterized by errors, which maximum possible dispersion range is priory known. It is obvious that in this case each element of the estimation-identification matrix is defined not by a single number but in the interval way, i.e. instead of a_{ij} $\left(i = \overline{1,m};\ j = \overline{1,n}\right)$ there exists $\tilde{a}_{ij}$ $\left(i = \overline{1,m};\ j = \overline{1,n}\right)$, which may take any value from the interval $\left[a_{ij} - \delta_{ij},\ a_{ij} + \delta_{ij}\right]$ $\left(i = \overline{1,m};\ j = \overline{1,n}\right)$. Then, apart from the abovementioned problem of a stable inverse transformation of the estimation-identification matrix, there appears one more problem, namely, due to the fact that there exists not really a single ill-conditioned matrix A, but a whole family (containing, possibly infinitely large number of elements)of ill-conditioned matrices

$A(\delta)$, then it is important to find which of them is more or less adequately describes the estimation-identification values of students characteristics / indicators in order to implement the inverse transformation procedure exactly for that matrix.

In the next subsection of this paper it is proposed new regularizing algorithm required for the stable inverse transformation of matrix A. The background of the proposed algorithm contains the idea of Tikhonov regularization method (for instance, see (Engl & Neubauer, 1985; Bauer & Lukas, 2011; Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001; Sizikov, 2003; Ramm, 2005; Morozov, 1984; Verlan & Sizikov, 1986)). However, as it will be obvious from the contents of next subsection of this paper, the proposed approach has a radical distinction from the Tikhonov classical approach to selection of the regularization parameter α in the Tikhonov functional $M^{\alpha}\left[z,u_{\delta}\right]$.

For the stable inverse transformation of estimation-identification matrix A let us consider the following operator equation:

$$Az=u, \tag{6}$$

where $z\in Z$ is the required element; $u\in U$ is a given element; Z and U are the Hilbert spaces; operator $A:Z\to U$ is a given linear bounded operator. Let us emphasize once again that operator in our specific case is finite-dimensional operator, i.e. it is a matrix, however all results that are obtained below remain valid also for infinite-dimensional linear bounded operators, in particular, for the completely continuous operators.

As it has been mentioned in subsection 2.1, elements of the estimation-identification matrix A are the result of assessment / "measurement" of students' characteristics / indicators and, hence, they are given with some errors. Therefore, instead of equation (6) we shall consider the approximate equation

$$A^{\{h\}}z=u^{\{\delta\}}, \tag{7}$$

where

$$\left\|A-A^{\{h\}}\right\|\le h,\ \left\|u-u^{\{\delta\}}\right\|_{U}\le\delta,\ \delta>0,\ h\ge 0. \tag{8}$$

Denoted $\Delta\overset{def}{\equiv}(\delta;h)$, we able to formulate our target in the following way: it is necessary to find such solution $z^{\{\Delta\}}\in Z$ of the equation (7) based on given $\left\{A^{\{h\}},u^{\{\delta\}};\Delta\right\}$, which satisfy conditions (8) making it stable, i.e. that satisfies the following condition $\left\|z^{\{normal\}}-z^{\{\Delta\}}\right\|_{Z}\xrightarrow{\Delta\to 0}0$, whereas $z^{\{normal\}}\in Z$ it is designated the normal pseudosolution (i.e. solution having a minimal norm function in the space Z) of the equation (6). In order to demonstrate a significant difference of a new approach proposed in this paper devoted to the selection of the optimal regularization parameter α in the Tikhonov functional $M^{\alpha}\left[z,u_{\delta}\right]$ from the traditional regularizing methods, let us briefly discuss the method of Tikhonov regularization (for instance, see (Engl & Neubauer, 1985; Bauer & Lukas, 2011; Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001; Sizikov, 2003; Ramm, 2005; Morozov, 1984; Verlan & Sizikov, 1986)), focusing the particular attention on the problem of optimal regularization parameter selection taking the advantage of traditional methods (for instance, see (Engl & Neubauer, 1985; Bauer & Lukas, 2011; Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001; Sizikov, 2003; Ramm, 2005; Morozov, 1984; Verlan & Sizikov, 1986; Guseynov & Volodko, 2003; Guseynov & Okruzhnova, 2005; Dmitriev & Guseynov, 1995; Guseynov, 2003) and respective references given in these).

In the Tikhonov regularization method instead of equation (7) there is considered and solved equation

$$\left(A^{\{h\}}\right)^{*}A^{\{h\}}z^{\alpha}+\alpha\cdot z^{\alpha}=\left(A^{\{h\}}\right)^{*}u^{\{\delta\}}, \tag{9}$$

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 04 ISSN 1309-6249

where $\alpha = \alpha(\Delta) > 0$ is a regularization parameter; A^* is a conjugate to A operator. In (Engl & Neubauer, 1985; Bauer & Lukas, 2011; Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001; Sizikov, 2003; Ramm, 2005; Morozov, 1984; Verlan & Sizikov, 1986; Guseynov & Volodko, 2003; Guseynov & Okruzhnova, 2005; Dmitriev & Guseynov, 1995; Guseynov, 2003) and in variety of corresponding papers there are presented diverse methods distinct on the classification and degree of accuracy both for selection of optimal and / or quasi-optimal regularization parameter $\alpha = \alpha(\Delta)$, and for estimation of regularizing solution z^{α} error $\left\| z^{\{normal\}} - z^{\alpha} \right\|_{\bullet}$. In all these approaches the major requirement / condition is the requirement of vicinity $\left\| z^{\{normal\}} - z^{\alpha} \right\|_{\bullet}$ to $\left\| z^{\{normal\}} - z^{\alpha_{exact\_optimal}} \right\|_{\bullet} = \min_{\alpha(\Delta)>0} \left\| z^{\{normal\}} - z^{\alpha(\Delta)} \right\|_{\bullet}$ in the asymptotics at $\Delta = (h;\delta) \to 0$, and not for the finite $h \geq 0$ and $\delta > 0$. In other words, the traditional approaches for the finite h and δ ensure the sufficiently good results only for the initially modeled problems, which are specially selected for the demonstration purposes allowing to show the capabilities of one or another method in respect to selection optimal and / or quasi-optimal regularization parameter. As it is shown in (Verlan & Sizikov, 1986), even if for some of these specially chosen modeled problems traditional algorithms of optimal and / or quasi-optimal regularization parameters selection for the finite values (even for arbitrary small values) h and δ provide an increased value $\alpha(\Delta)$ in comparison with the exact optimal $\alpha_{exact\_optimal}(\Delta)$ and, hence, there take place minimum two distortions: 1) the assessment $\left\| z^{\{normal\}} - z^{\alpha} \right\|_{\bullet}$ is increased compared to the required assessment $\left\| z^{\{normal\}} - z^{\alpha_{exact\_optimal}} \right\|_{\bullet}$; 2) the resolvability of the Tikhonov regularization method is decreased (for instance, see (Guseynov & Okruzhnova, 2005; Dmitriev & Guseynov, 1995)) – it means that the solution obtained using traditional approaches $z^{\alpha} \in Z$ is in fact smoother compared to the required solution $z^{\alpha_{exact\_optimal}} \in Z$. Therefore, there is the only conclusion: for the finite values of h and δ without a priori significant additional qualitative and / or quantitative assumptions regarding the desired solution of equation (6) in a traditional way it is not possible to obtain the exact optimal solution for regularization parameter $\alpha_{exact\_optimal}(\Delta)$, if only the specially chosen modeled problems are not studied. As it could be noticed from the solution of numerous modeled problems (for instance, see (Verlan & Sizikov, 1986; Guseynov & Volodko, 2003; Guseynov & Okruzhnova, 2005)), the abovementioned two distortions take place as soon as relative errors of the principal operator in the right-hand side of equation (7) is greater than 1%, i.e. when $relative\_error\_h > 1\%$ and $relative\_error\_\delta > 1\%$.

Regularizing algorithm with empirical way of regularization parameter selection

So, let us consider the problem (7), (8), and introduce the following designations: $\overline{A}^{\{h\}} \stackrel{def}{\equiv} \left(A^{\{h\}}\right)^* A^{\{h\}}$; $\overline{u}^{\{h;\delta\}} \stackrel{def}{\equiv} \left(A^{\{h\}}\right)^* u^{\{\delta\}}$. Then Tikhonov equation (9) takes the form

$$\overline{A}^{\{h\}} z^{\alpha} + \alpha \cdot z^{\alpha} = \overline{u}^{\{h;\delta\}}. \quad (10)$$

Further, comparing the initial approximate equation (7) with the equation (10), it could be noted that in classical Tikhonov regularization method the initial equation is, in fact, not equation (7), but the equation

$$\overline{A}^{\{h\}} z^{\alpha} = \overline{u}^{\{h;\delta\}}, \quad (11)$$

i.e. the right-hand side $u^{\{\delta\}} \in U$ of the initial equation (7) is not explicitly included into the classical method of Tikhonov regularization, while at the same time in all the different variations of the residual method, including the generalized residual principle (for instance, see (Morozov, 1984)), it is used the right-hand side $u^{\{\delta\}} \in U$, error δ instead of the right-hand side error $\overline{u}^{\{h;\delta\}} \in U$, which, as it is obvious from (11), is dependent not only on δ, but also on h. Hence, random errors in $u^{\{\delta\}} \in U$ may be substantially smoothened and, therefore, relative error $\overline{u}^{\{h;\delta\}} \in U$, which, as it was recently mentioned, in classical Tikhonov regularization method is not

taken into account, may be substantially different (even by several orders!) from the relative error $u^{\{\delta\}} \in U$, which, we have cleared out above, is the only one that is taken into account in the classical Tikhonov regularization method.

Remark 2. *Just noted fact becomes quite evident, if in the equation (7) as the principal operator $A^{\{h\}}$ to take, for example, the Fredholm integral operator, acting from $L_2[a,b]$ to $L_2[a,b]$, i.e. $A^{\{h\}}[\bullet] \equiv^{def} \int_a^b K^{\{h\}}(x,y)\cdot[\bullet]dy$: in this case, we have $\overline{u}^{\{h;\delta\}}(x) = \int_a^b K^{\{h\}}(x,y)\cdot u^{\{\delta\}}(y)dy$ and, therefore, due to the fact that integration operation is a smoothing filter, then with respect to function $u^{\{\delta\}}(y) \in L_2[a,b]$ we obtain a sufficiently smoothed function $\overline{u}^{\{h;\delta\}}(x) \in L_2[a,b]$.*

Outlined in the Remark 2 property with smoothing of random errors in the equal measure refers to the right-hand side of equation (11), namely, in the left-hand side of this equation there is located a principal operator $\overline{A}^{\{h\}}$, which error could differ substantially from the error of the principal operator $A^{\{h\}}$ of the initial approximate equation (7), however in the classical Tikhonov regularization method it is taken into account particularly the error of operator $A^{\{h\}}$, instead of the error referring to the actual (i.e. that is really present in equation (6)) operator $\overline{A}^{\{h\}} = \left(A^{\{h\}}\right)^* A^{\{h\}}$.

To summarize the abovementioned, we conclude that it is necessary to use instead of errors $\Delta = (\delta; h)$ relevant to initial data $\left\{A^{\{h\}}; u^{\{\delta\}}\right\}$ of the problem (7), (8) in a Tikhonov regularization method, errors $\overline{\Delta}$ of the initial data $\left\{\overline{A}^{\{h\}}; \overline{u}^{\{h;\delta\}}\right\}$. Hence, we propose instead of the initial problem (7), (8) immediately consider equation (11), in addition taking into account in the Tikhonov regularization method errors of the actual initial data of that equation, i.e. principal operator $\overline{A}^{\{h\}} \equiv^{def} \left(A^{\{h\}}\right)^* A^{\{h\}}$ errors as well as errors of the element $\overline{u}^{\{h;\delta\}} \equiv^{def} \left(A^{\{h\}}\right)^* u^{\{\delta\}}$. This consideration, as it will be seen from the hereinafter contained treatment causes the fundamental difference in optimal and / or quasi-optimal regularization parameter selection. Let us present this methodology. In accordance with generalized residual principle (for instance, see (Morozov, 1984) as well as (Bauer & Lukas, 2011; Kojdecki, 1996)), regularization parameter $\alpha = \alpha(\Delta) > 0$ is a root of the equation

$$\left\|A^{\{h\}} z^{\alpha} - u^{\{\delta\}}\right\|_U = \left(\delta + h\cdot\left\|z^{\alpha}\right\|_Z\right)^2 + \left(\inf_{z\in Z}\left\|A^{\{h\}} z - u^{\{\delta\}}\right\|_U\right)^2, \quad (12)$$

where $\inf_{z\in Z}\left\|A^{\{h\}} z - u^{\{\delta\}}\right\|_U$ is a measure of incompatibility of the initial problem(7), (8). As it is shown in (Kojdecki, 1996) (as well as see (Kojdecki, 2000; Kojdecki, 2001)), regularization parameter $\alpha = \alpha(\Delta) > 0$ is the root of the equation

$\alpha^k \cdot \left\|\left(A^{\{h\}}\right)^* A^{\{h\}} z^{\alpha} - \left(A^{\{h\}}\right)^* u^{\{\delta\}}\right\|_U = \lambda \cdot \left\|A^{\{h\}}\right\| \cdot \left(\delta + h\cdot\left\|z^{\alpha}\right\|_Z\right)$, where $k \geq 0$ and $\lambda > 0$ are some constants.

From here, in respect to (9), we obtain

$$\alpha^{k+1} \cdot \left\|z^{\alpha}\right\|_Z = \lambda \cdot \left\|A^{\{h\}}\right\| \cdot \left(\delta + h\cdot\left\|z^{\alpha}\right\|_Z\right). \quad (13)$$

In this paper for finding the optimal regularization parameter it is proposed to use instead of equation (13), the following equation, whose root is a desired regularization parameter (this statement will be revealed and mathematically strictly proved):

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$$\left\|z^{\alpha}\right\|_Z \cdot \left(\alpha^{k+1} - \lambda \cdot \sup_{h\geq 0}\left\|\overline{A} - \overline{A}^{\{h\}}\right\|\right) = \lambda \cdot \sup_{h\geq 0,\delta>0}\left\|\overline{u} - \overline{u}^{\{h;\delta\}}\right\|_U, \quad (14)$$

where $k \geq 0;\ \lambda > 0;\ \overline{A} \overset{def}{\equiv} A^* A;\ \overline{u} \overset{def}{\equiv} A^* u.$

Main difference of equations (13) and (14) is rooted in the fact that value of "new" variable $\Sigma_{New}(\alpha) \overset{def}{\equiv} \sup_{h\geq 0,\delta>0}\left\|\overline{u} - \overline{u}^{\{h;\delta\}}\right\|_U + \left\|z^{\alpha}\right\|_Z \cdot \sup_{h\geq 0}\left\|\overline{A} - \overline{A}^{\{h\}}\right\|$

In the equation (14) cannot exceed the value of "old" variable $\Sigma_{Old}(\alpha) \overset{def}{\equiv} \left\|A^{\{h\}}\right\| \cdot \left(\delta + h \cdot \left\|z^{\alpha}\right\|_Z\right)$ in the equation (13), i.e. $\Sigma_{New}(\alpha) \leq \Sigma_{Old}(\alpha)\ \ \forall \alpha > 0,$ moreover, this inequality can be very strict. What is it useful for? – This ensures that the root $\alpha_{optimal} \overset{def}{\equiv} \alpha_{root} > 0$ of the equation (14) and residual $\left\|z^{\{normal\}} - z^{\alpha_{optimal}}\right\|_Z$ are not overstated. Furthermore, by comparing equations (13) and (14), we can see that that the idea of taking into account actual initial data errors from the equation (6) in the Tikhonov regularization method (i.e. taking into account error of principal operator $\overline{A}^{\{h\}}$ in the equation (11) and errors of the right-hand side of the element $\overline{u}^{\{h;\delta\}}$ of the equation (11)) ensures equality to zero of the incompatibility measure of the equation (11), i.e. $\inf_{z\in Z}\left\|\overline{A}^{\{h\}} z - \overline{u}^{\{h;\delta\}}\right\|_U = 0.$ This fact is significant, and it fundamentally distinguishes the proposed equation (14) and equation (12) of the generalized residual principle.

Asymptotical assessments and outcome of regularizing operator

Now let us ask the main question – whether the discovered root $\alpha_{root} > 0$ of the proposed equation (14) induces the regularizing operator? If the answer is positive, then there arise two more questions: (a) under which conditions the solution of proposed equation (9) exist and is unique? (b) what is the order of the found regularization solution $z^{\alpha_{optimal}} = z^{\alpha_{root}}$ to the normal pseudosolution $z^{\{normal\}}$? In order to answer these important questions, first of all it is necessary to set some estimates both for the root $\alpha_{root} > 0$ of the equation (14), and for the residual $\left\|z^{\{normal\}} - z^{\alpha_{root}}\right\|_Z$. It is easy to see that under the conditions

$$\begin{cases} \dfrac{\sup_{h\geq 0,\delta>0}\left\|\overline{u} - \overline{u}^{\{h;\delta\}}\right\|_U}{\left\|\overline{u}^{\{h;\delta\}}\right\|_U} < \dfrac{1}{\lambda} & if \quad k = 0; \\ \left\|\overline{u}^{\{h;\delta\}}\right\|_U \neq 0 & if \quad k > 0 \end{cases} \quad (15)$$

Function $\left\|z^{\alpha}\right\|_Z \cdot \alpha^{k+1}$ as a function depending from the argument α is a monotonically increasing continuous function on semiaxis $(0, +\infty)$, and function $\lambda \cdot \left(\left\|z^{\alpha}\right\|_Z \cdot \sup_{h\geq 0}\left\|\overline{A} - \overline{A}^{\{h\}}\right\| + \sup_{h\geq 0,\delta>0}\left\|\overline{u} - \overline{u}^{\{h;\delta\}}\right\|_U\right)$ as well as function dependent on argument α is a monotonically decreasing continuous function located on the same semiaxis. Moreover, under the conditions (15) there take place the following asymptotics:

$\left\|z^{\alpha}\right\|_Z \cdot \alpha^{k+1} \xrightarrow{\alpha\to+\infty} +\infty,$ if $k > 0,\ \left\|\overline{u}^{\{h;\delta\}}\right\|_U \neq 0;$

$\left\|z^{\alpha}\right\|_Z \cdot \alpha^{k+1} \xrightarrow{\alpha\to+\infty} \left\|\overline{u}^{\{h;\delta\}}\right\|_U,$ if $k = 0;$

$\left\|z^{\alpha}\right\|_Z \cdot \alpha^{k+1} \xrightarrow{\alpha\to+\infty} 0,$ if $k > 0,\ \left\|\overline{u}^{\{h;\delta\}}\right\|_U = 0;$

$\left\|z^{\alpha}\right\|_Z \cdot \alpha^{k+1} \xrightarrow{\alpha\to+0} 0;$

$\left\|z^{\alpha}\right\|_Z \cdot \sup_{h\geq 0}\left\|A^* A - \overline{A}^{\{h\}}\right\| + \sup_{h\geq 0,\delta>0}\left\|A^* u - \overline{u}^{\{h;\delta\}}\right\|_U \xrightarrow{\alpha\to+\infty} \sup_{h\geq 0,\delta>0}\left\|A^* u - \overline{u}^{\{h;\delta\}}\right\|_U;$

International Journal on New Trends in Education and Their Implications
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$$\sup_{h\geq 0,\delta>0}\left\|A^{*}u-\overline{u}^{\{h;\delta\}}\right\|_{U}<\lim_{\alpha\to 0+0}\left(\left\|z^{\alpha}\right\|_{Z}\cdot\sup_{h\geq 0}\left\|A^{*}A-\overline{A}^{\{h\}}\right\|+\sup_{h\geq 0,\delta>0}\left\|A^{*}u-\overline{u}^{\{h;\delta\}}\right\|_{U}\right).$$

Further, since the proposed equation (14) is equivalent to the equation

$$\left\|z^{\alpha}\right\|_{Z}\alpha^{k+1}=\lambda\left(\left\|z^{\alpha}\right\|_{Z}\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|+\sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}\right),\tag{16}$$

where $k\geq 0;\ \lambda>0,$ then given above asymptotic assessments, along with the abovementioned properties of strict monotonicity and continuity of the functions $\left\|z^{\alpha}\right\|_{Z}\cdot\alpha^{k+1}$ and $\lambda\cdot\left(\left\|z^{\alpha}\right\|_{Z}\cdot\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|+\sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}\right),$ and which, as it is evident from (16), are respectively the left-hand and right-hand sides of this equation, allow ascertaining the following significant fact (now it is obvious by virtue of the Brouwer-Schauder Fixed Point Theorem: for instance, see (Hutson & Pym, 1980)): if the conditions (15) are satisfied, the equation (16) (hence, the equivalent to it equation (14)) has the only fixed point, i.e. equation (14) has the single root, and particularly this single root will be taken as optimal regularization parameter in the Tikhonov regularization method (i.e. in the Tikhonov equation (10)). Exhaustive answer to this above pointed question should be found since (a), having no answer it is impossible to find an answer to the main question (b) – is the unique equation (14) root being found inducing the regularizing operator? To answer this major question, first let us give some upper estimates, which correctness is fairly easy revealed, by using known facts, that for bounded linear operators A and $B,$ reflecting the Banach space Z into the Banach space $U,$ there are valid $\|A\|=\left\|A^{*}\right\|$ and $\|AB\|\leq\|A\|\cdot\|B\|$:

$$\begin{cases}\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|\leq 2\cdot\left\|A^{\{h\}}\right\|\cdot h;\\ \sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}\leq\left\|A^{\{h\}}\right\|\cdot\delta+\left\|u^{\{\delta\}}\right\|_{U}\cdot h.\end{cases}\tag{17}$$

Further let us assume

$$\frac{\sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}}{\left\|\overline{u}^{\{h;\delta\}}\right\|_{U}}\leq\frac{\left\|\overline{A}^{\{h\}}\right\|^{k}}{2\cdot\lambda}-\frac{\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|}{\left\|\overline{A}^{\{h\}}\right\|},\tag{18}$$

which, in fact, is generalization of the first inequality in (15). Satisfying the (18) condition guarantees the validity of the following very useful (especially when the finite errors $\Delta=(h;\delta)$ of the initial data of the initial problem (7), (8)) upper estimate for the root (and as it has been proved above, unique) $\alpha_{root}>0$ of the equation (14):

$$\alpha_{root}^{k+1}\leq\left(\sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}+\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|\right)\cdot\left(\lambda\cdot\max\left\{1,\frac{2\cdot\left\|\overline{A}^{\{h\}}\right\|}{\left\|\overline{u}^{\{h;\delta\}}\right\|_{U}}\right\}\right),\tag{19}$$

From which at $\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|\to 0,\ \ \sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}\to 0$ there immediately and directly follows the asymptotic assessment $\alpha_{root}=O\left(\sup_{h\geq 0,\delta>0}\left\|\overline{u}-\overline{u}^{\{h;\delta\}}\right\|_{U}+\sup_{h\geq 0}\left\|\overline{A}-\overline{A}^{\{h\}}\right\|\right)^{\frac{1}{k+1}},$ which is regarded to be less useful (i.e. rougher, allowing the over the optimal value of the optimal regularization parameter) in solving the real problem of determining the diagnostic matrix for finding a stable solution of estimate-identification parameters of the dual-circuit gas turbine engine. Now having at our disposal the obtained above results (namely, having equation (14); upper estimates (17) for errors of principal operator and for the right-hands side of the equation (11); conditions (15) and (18); upper estimate (19) for the root of the equation (14)), we could give the upper evaluation to the error of the solution $z^{\alpha_{root}}$ of the Tikhonov equation (10), where selection of optimal and/or quasi-optimal regularization parameter is achieved by solving of the proposed and justified equation (14)

instead of traditional approaches. Let us estimate the residual $\left\| z^{\{normal\}} - z^{\alpha_{root}} \right\|_Z \equiv \left\| z^{\{normal\}} - z^{\alpha_{optimal}} \right\|_Z$. In order to do that, alongside with the obtained results, let us apply the following results from (Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001):

$$\left\| z^{\{normal\}} - z^{\alpha} \right\|_Z \le \alpha^{-1} \left(\sup_{h \ge 0} \left\| A^* A - \overline{A}^{\{h\}} \right\| + \sup_{h \ge 0, \delta > 0} \left\| A^* u - \overline{u}^{\{h;\delta\}} \right\|_U \right) \max\left\{ 1, \left\| z^{\{normal\}} \right\|_Z \right\} + \alpha \left\| \left(\alpha E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} z^{\{normal\}} \right\|_U, \quad (20)$$

whereas E is denoted the unit operator. In (Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001) the following three useful evaluations were achieved, which imply the boundedness of the operator $\left(\alpha \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1}$:

$$\left\| \left(\alpha \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \left(A^{\{h\}} \right)^* A^{\{h\}} \right\|_U \le 1;$$

$$\left\| \left(\alpha \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \left(A^{\{h\}} \right)^* \right\|_U \le \frac{1}{2 \cdot \sqrt{\alpha}};$$

$$\left\| \left(\alpha \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \right\|_U \le \frac{1}{\alpha},$$

Let us note that first two evaluations may be successfully applied to the residual (20). Along with the obtained results we will also use the estimate (20). For now our main objective is to identify the upper bound of the norm function $\left\| \left(A^{\{h\}} \right)^* A^{\{h\}} \left(z^{\{normal\}} - z^{\alpha_{root}} \right) \right\|_U$:

$$\left\| \left(A^{\{h\}} \right)^* A^{\{h\}} \left(z^{\{normal\}} - z^{\alpha_{root}} \right) \right\|_U = \left\| \left(A^{\{h\}} \right)^* A^{\{h\}} \left\{ \left(\alpha_{root} \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \left(A^{\{h\}} \right)^* u^{\{\delta\}} \right.\right.$$

$$\left.\left. - \left(\alpha_{root} \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \left(\alpha_{root} \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right) z^{\alpha_{root}} \right\} \right\|_U = \left\| \left(A^{\{h\}} \right)^* A^{\{h\}} \left(\alpha_{root} \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \left\{ \left(A^{\{h\}} \right)^* u^{\{\delta\}} - A^* u \right\} \right.$$

$$\left. + \left(A^{\{h\}} \right)^* A^{\{h\}} \left(\alpha_{root} \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} \left\{ A^* A - \left(A^{\{h\}} \right)^* A^{\{h\}} \right\} z^{\alpha_{root}} - \alpha_{root} \cdot \left(A^{\{h\}} \right)^* A^{\{h\}} \left(\alpha_{root} \cdot E + \left(A^{\{h\}} \right)^* A^{\{h\}} \right)^{-1} z^{\alpha_{root}} \right\|_U$$

$$\le \left(\sup_{h \ge 0} \left\| A^* A - \overline{A}^{\{h\}} \right\| + \sup_{h \ge 0, \delta > 0} \left\| A^* u - \overline{u}^{\{h;\delta\}} \right\|_U \right) \cdot \max\left\{ 1, \left\| z^{\{normal\}} \right\|_Z \right\} + \alpha_{root} \cdot \left\| z^{\alpha_{root}} \right\|_Z.$$

The following upper bound has been found:

$$\left\| \left(A^{\{h\}} \right)^* A^{\{h\}} \left(z^{\{normal\}} - z^{\alpha_{root}} \right) \right\|_U \le \left(\sup_{h \ge 0} \left\| A^* A - \overline{A}^{\{h\}} \right\| + \sup_{h \ge 0, \delta > 0} \left\| A^* u - \overline{u}^{\{h;\delta\}} \right\|_U \right) \max\left\{ 1, \left\| z^{\{normal\}} \right\|_Z \right\} + \alpha_{root} \left\| z^{\alpha_{root}} \right\|_Z. \quad (21)$$

Obtained in equality (21) allows positively answering to the above stated main question: proposed and justified empirical choice of the optimal regularization parameter $\alpha_{optimal}$ as a solution α_{root} of equation (14) induces Tikhonov regularizing operator. Really, taking into account inequalities (17) in the newly obtained upper bound (21), and then passing in the resulting inequality to the limit at $\Delta = (h;\delta) \to 0$, we have $\left\| z^{\{normal\}} - z^{\alpha_{root}} \right\|_Z = O\left(\delta + h \right)^{\frac{1}{k+1}}$, that proves the convergence by norm function (i.e. strong convergence!) of the normalized solution $z^{\alpha_{optimal}} \equiv z^{\alpha_{root}}$, obtained from the Tikhonov equation (10), where as an optimal regularization parameter $\alpha_{optimal}$ it was taken the single root of the equation (14), to the normal pseudosolution $z^{\{normal\}}$. Moreover, for the error of resulting regularized solution there is present an upper estimate (21), and for the optimal regularization parameter $z^{\alpha_{optimal}} \equiv z^{\alpha_{root}}$ is valid the upper estimate (19).

ACKNOWLEDGMENTS

The authors would like to express their gratitude to Dr. Kojdecki Marek Andrzej from the Institute of Mathematics and Cryptology, Military University of Technology, Warsaw, Poland and Professor Sizikov Valery Sergeevich from the Department of Measurement Technologies and Computer Tomography, St.Petersburg State University of Information Technologies, Mechanics and Optics, St. Petersburg, Russian Federation for the opportunity to get acquainted with their significant results obtained in (Kojdecki, 1996; Kojdecki, 2000; Kojdecki, 2001; Sizikov, 2003).

Present article was executed within the framework of the European Social Fund (ESF) Project No. 1DP/1.1.1.2.0/09/APIA/VIAA/142 *"Elaboration of effective analytical and numerical methods for solving of direct and inverse mathematical physics problems in material, economics and environment sciences"* (for the first, second and fourth authors).

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 05 ISSN 1309-6249

PRE-SERVICE SCIENCE TEACHERS PERCEPTIONS AND PRACTICES RELATED TO HISTORY OF SCIENCE INSTRUCTIONS

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ABSTRACT

The purposes of this study were to describe pre-service science teachers'(PTs) perceptions and practices about using history of science(HOS) in their instructions and their experiences as in-service teachers(ITs) and to determine the relationship between PTs perceptions and practices about using HOS in their classrooms. The HOS Instructional Survey was administered to 68 PTs in two different universities in Turkey. After these students had graduated, some questions were asked about their views about practicing integrating the HOS in their instruction to the 19 ITs who started to work in schools. Findings revealed that PTs had favorable level of perceptions and practices about using HOS in their classrooms. Furthermore, PTs' perceptions are highly correlated with their practices about using HOS in their classrooms. Interview results revealed that after PTs become ITs, in their teaching practices of history of science they emphasized mostly conceptual understanding and the least emphasis given to contextual understanding.

Key Words: History of Science, Pre-service Teachers, In-service Teachers .

INTRODUCTION

There are some main goals of science education explained by the researchers. One of these aims is developing informed nature of science understanding. In order to achieve these aims science education should have instructional materials a wide range of methodologies, and inquiry procedures (Hurd, 1970). In the National Science Education Standards it was emphasized that history of science has an important role while achieving science education goals (NCR 1996). Teaching science integrating with history of science has been investigated by many researchers over a century (Lin, 1998; Matthews, 1994; Solomon, Duveen, & Scot, 1992). Solomon, et al. (1992) explain the advantage of incorporating history of science in science teaching in these main areas "a) better learning of concepts of science, b) increased interest and motivation, c) an introduction of the philosophy of science, d) a better attitude of the public towards science, and understanding of social relevance of science" (Solomon, 1992 p.410). Whang and Schmidt (2001) conducted a study to examine students'

learning in History of science through the world and the way of teaching history, philosophy and sociology of science (HPSS). They also investigated the relationship between HPSS and students' science achievement. These data were obtained from (1) educational officials' reports of HPSS coverage, (2) curriculum guides' HPSS coverage, (3) science textbooks' HPSS coverage, and (4) teachers' report of HPSS practices. The way of teaching HPSS environment were investigated with respect to different dimension namely; Influence of Science, Technology on Society; Influence of Society on Science, Technology; History of Science & Technology; Nature of Scientific Knowledge; The Scientific Enterprise. Results of the study revealed that HOS was the most favorite area of Hisory philosophy, and sociology of science in at least one grade level. Second most popular topic was Influence of Science, Technology on Society in the worldwide science classrooms. History of Science and Technology and Influence of Science, Technology on Society was the most coherent topic covered by both guides and textbooks respectively. USA was the first country in terms of the percentage of teachers who reported that they taught HPSS and percentage of instructional time they dedicated to HPSS areas in their science classrooms.

Teaching with the history of science improves the understanding of the nature of science (Solomon, et al., 1992; Seker & Welsh, 2006; Irwin, 2000); however effect of history of science on students' learning of scientific concepts is still controversial (Seker & Welsh, 2006).Teachers use the history of science in their instructions for different purposes namely; to promote conceptual understanding, procedural understanding, and contextual understanding (Wang & Marsh, 2002). In one such study, researchers (Wang & Marsh, 2002) intended to investigate teachers' perceptions of the instructional role of the history of science, and their practices of teaching science from a historical point of view. In this study history of science instructional survey was implemented to twelve teachers, and then among these teachers five of them were selected for the interview. History of science instructional survey includes three domains of understanding as history of science conceptual framework, namely; conceptual understanding, procedural understanding, and contextual understanding. According to Wang and Marsh (2002, p.180) the conceptual, procedural and contextual framework of using history of science in instructions was described in Figure 1.

Conceptual understanding	*The description, presentation, comparison or contradiction of scientific*
	a)thoughts, ideas, concepts, notions, plans, schemes,
	b)definition, explanations, models, illustrations, graphics, instrumentation
	c)findings, standards, laws, theories to
	enriching the presentation of scientific knowledge
	emphasizing the tentative nature of scientific knowledge
Procedural understanding	*process of thinking or experiment,* *process of investigation* *process of concluding, inferring, elaboration, reporting, and application.*
Contextual understanding	*Psychological factors involved in the science making (e.g., motivation, incentives, purposes)* *Social factors (e.g., peer influences, public attitudes, social needs, or political factors that effect on the scientists action)* *Cultural factors associated to the science research (e.g., personalities, culture of family, organization, social, or ethics, etc.)*

Figure 1: History of science conceptual framework

The findings of this study revealed that teachers were more likely to incorporate historical elements regarding contextual understanding than the other categories. Especially teachers did not integrate procedural understanding with their curriculum. Teachers believed their curriculum was overloaded with topics; therefore they could not emphasize the importance of the history of science in their curriculum.

Another study (Wang, & Cox-Petersen, 2002) which aims to compare elementary, secondary and student teachers' perceptions and practices related to history of science instruction was the extended version of previous study (Wang & Marsh, 2002). Sample consisted of 43 elementary teachers, 8 middle school science teachers, and 21 high school science teachers. History of science instructional survey was applied to these teachers. The findings of the study showed that teachers had different views with respect to their grade levels which they teach. Most high school teachers use history of science to promote students' understanding of the content and nature of scientific knowledge. Also they used history of science to develop their scientific process skills. Most elementary teachers support that the history of science can help students' understanding the role of science in the society, and to increase students' positive attitude toward science.

With these respects, the purposes of present study had two aspects: (1) to describe pre-service science teachers' perceptions and practices about using history of science in their instructions and their experiences as in-service teachers. (2) to determine the relationship between PTs perception and practices about using history of science in their classrooms.

METHOD

Sample and Data Collection

This study included both qualitative and quantitative parts as a longitudinal research. History of Science Instructional Survey was administered to 68 pre-service science teachers in two different universities in the capital city of the country. Approximately 83.4% of the pre-service science teachers completed all of the survey questions for the quantitative part of the study. After graduation, some of these pre-service science teachers pursued their careers as teachers in elementary schools. As a longitudinal study these teachers were followed and their views on integrating history of science into their science instruction and their experiences were also explored qualitatively. In our country because of a national exam some of the pre-service science teachers could not start their career after their graduation. Therefore, 19 in-service teachers could respond to our survey questions in the following year.

History of Science Instructional Survey developed by Wang and Marsh (2002) was translated and adapted by researchers. This instrument is 5-Likert type scale and consists of 26 items. Of the 13 items, 4 related to conceptual domain of understanding, 3 related to procedural domain of understanding, and 6 items related to contextual domain of understanding for both their perceptions and practices. Two open ended questions were added to the end of the survey in order to examine pre-service teachers' views about the history of science more deeply. Following year the teachers who become in-service teachers were asked to describe how and why they integrated history of science in their class and to give an example about their instructions.

Data Analysis and Results

For quantitative part of this study descriptive statistic results showed that pre-service science teachers had favorable level of perceptions and practices about using history of science in their classrooms. Descriptive statistic results of pre-service science teachers perceptions and practices about using history of science were presented in Table 1.

Table 1: Descriptive statistic results of pre-service science teachers' perceptions and practices about using history of science

	Dimension	M	S.D
Perceptions	Conceptual understanding	4.25	.50
	Procedural understanding	4.16	.60
	Contextual understanding	4.27	.48
Practices	Conceptual understanding	4.25	.50
	Procedural understanding	4.14	.62
	Contextual understanding	4.26	.48

Correlation results showed that pre-service science teachers' perception is highly correlated with their practices about using history of science in their classrooms. Correlation results between pre-service science teachers' perceptions and practices about using history of science were shown in Table 2.

Table 2 : Correlation Results

	Conceptual Perceptions	Procedural Perceptions	Context Perceptions
Conceptual Practices	.769*	.631*	.699*
Procedural Practices	.517*	.875*	.611*
Contextual Practices	.596*	.753*	.908*

* Correlation is significant at the .01 level

For qualitative parts of this study interview results revealed that after pre-service science teachers become in-service teachers, in their teaching practices of history of science they emphasized mostly conceptual understanding and the least emphasis given to contextual understanding. Teachers reported that they most emphasized tentative nature of scientific knowledge through the history of science in science courses.

One of the teachers gave an example about his/her application in the course as;
"I used history of science especially while I was teaching the structure of the atoms. Students have understood that the structure of atom has changed over the years. I gave them project about examination and presentation of scientists' life and their scientific projects. In this way, students both entertained and learned"

Another teacher pointed out different aspect of integration of history of science in science courses.
"I integrated history of science and life of the scientists in my science course. In my class students realized that scientists were not different people from the other people."

Some of the teachers mentioned that even if they want to integrate history of science in science courses, they could not achieve their aims because of the overloading curriculum and classroom climate such as physical conditions and inadequate materials.

DISCUSSION AND CONCLUSION

Pre-service science teachers had remarkable perceptions and practices about using history of science in their classrooms. Their perceptions about integrating history of science in science lesson affect their practice directly. However they reported that they had insufficient knowledge about the history of science. Therefore most of the pre-service science teachers (93.8%) suggested that history of science course should be offered in the education faculty undergraduate programs. Some of the pre-service science teachers reported that "Although history of science was integrated with in Science-Technology-Society course in a limited time; history of science changed our attitude toward science". They reported that "history of science course can supply the process that how scientists attain scientific knowledge, increase student motivation, increase student awareness about changing scientific knowledge, and development process of changing knowledge. Moreover, the students may learn concepts of scientific models and their explanations permanently and meaningfully. History of science course helps students to understand that scientists are not different people from other people. They are not apart from the society and everybody can be scientist. Most of the pre-service science teachers thought that "History of science course is much related with nature of science, and history of science is reflection of the nature of science". Therefore, history of science course may have potential to improve students' nature of science understanding.

Another issue is integrating history of science and nature of science. Most of the students supported that history of science and nature of science should be incorporated with each other in such a course mentioned above. This idea has been supported in the literature, since history of science is used to improve students or pre-service teachers nature of science views (Seker & Welsh, 2006; Solomon, et al., 1992). On the other hand small number of student (6.3%) agreed that history of science course should not be open as a separate course. History of science should be integrated to another course in the undergraduate programs.

It was understood from the interviews that pre-service science teachers purpose of using history of science in their instructions changed after they become in-service teachers. Most of our in-service teachers integrated history of science in their instructions for conceptual understanding including the tentative nature of scientific knowledge. Some of the in-service teachers also integrated history of science in their instructions for Procedural understanding including process of investigation, but they realized that they gave the least importance to the contextual understanding such as cultural factors associated to the scientific research. Most of them explained the reason of this perception as indicating "In our new elementary science and technology curriculum more emphasis was given to tentative nature of scientific knowledge, therefore they used history of science in our instructions to promote this issue, also they gave importance scientific investigations if the number of the students in the class is appropriate for implementing these activities". They also reported that they did not realize that they had not mentioned about cultural factors in their instructions and they thought as a reason of this explaining there was no much more emphasis on this issue in our new elementary curriculum.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 06 ISSN 1309-6249

TEACHING EXPERIENCE - IMPROVING TEACHER EDUCATION WITH EXPERIENTIAL LEARNING

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ABSTRACT

At the basis of all current theories of experiential learning, action-oriented learning, student activation and similarly related principles, lies one simple truth: Human beings learn better when they can act and discover new facts for themselves. The value of hands-on learning is no longer in any real doubt, and it is being increasingly implemented in various school types and grade levels. However, when it comes to teacher education, many countries still continue to educate overwhelmingly in the "academic" style -- students sitting in a lecture hall or seminar room and listening to (or, in the best case, discussing) ideas and theories of how to teach. Drawing on several small-scale studies of different school types and age groups in Germany, this paper will show the pressing need to implement hands-on learning during university teacher education. After all, we cannot expect teachers to teach what they do not know themselves.

Key Words: Experiential Learning, teacher education, Germany.

INTRODUCTION

In the last 35 years, there has been substantial research done on the effectiveness of learning models that involve learner activation. Under titles such as "experiential learning", "active learning", "task-based teaching" and a variety of related monikers, theories and models of learning have emerged that establish the learner's activity as the central tenet of any learning/teaching environment. Regardless of their exact title, these theories are all based on a similar principle: that students learn effectively, and retain that learned information best, when they are actively involved in the learning process -- that is to say, when they are motivated to act and to discover facts and connections for themselves by being presented with complex tasks that require autonomous problem-solving.

There are numerous empirical studies in the English- and German-speaking academic communities showing the effectiveness of this type of learning. Admittedly, the results are mixed as to whether students actually learn *better* in the classical sense -- that is to say, whether they achieve higher results than students who are taught in traditional, instructor-centered formal classrooms. Some studies claim that students who learn under these conditions learn more and achieve higher results than their counterparts; others claim there is no appreciable difference; still others say that the class average with these methods is lower than with traditional methods, but that the best students outperform the best students from traditional classrooms, suggesting that this method particularly supports students who are already strong learners (for an overview, see Frey 2002, 175-176, as well as Kolb's 2005 *Experiential Learning Theory Bibliography*).

Where the studies do agree, however, is that content learned in a experiential context, through self-discovery and practical application, is retained for far longer, and can be accessed and transferred far more readily than content learned from traditional lecture styles. Even studies that show no appreciable difference in the level of knowledge achieved as a direct consequence of experiential learning offer clear evidence of later content retention to a much higher degree than traditionally learned information -- weeks, months, or even in some cases years later (for example the now-classic Specht & Sandlin study (1991); for an overview of earlier studies, see Frey 2002, 183-184).

And yet, despite the wealth of information about the benefits of this type of learning, its use in education is still minimal; as Karl Frey notes in his (for the German-speaking world) seminal work on project-oriented learning,

> "Diese Absichten stehen als bekannte Selbstverständlichkeiten in fast allen Bildungsartikeln der Staatsverfassungen, in Schulgesetzen und Lehrplanpräambeln. Sie sind aber keine Selbstverständlichkeiten der Schulpraxis" (Frey 2002, 51).
> *These intentions are included as self-evident facts in almost every article of every national constitution that deals with education, in school bylaws and curriculum preambles. They are not, however, self-evident in practice in the classroom (Frey 2002, 51, translation mine).*

Comparatively little time in the classroom is given to student-directed learning, while instructor-centered methods of teaching are still the most common form of classroom activity -- as much as 75% of classroom time, according to some studies (Nuthall and Snook 1977, Hage 1985, Kanders 1997, as discussed in Frey, 2002).

Recognition of the division between personal experience and education, and of the need to overcome this divide, is one that goes back to the second half of the nineteenth century: to John Dewey in the USA, as well as to the Reform Pedagogy movement in German-speaking Europe. Dewey was one of the first to promote alternative forms of hands-on, practical learning as the best way to involve students in their own learning; even without the results of decades of remarkable neuro-didactic research to support his claims, he saw that students learned "better", retained the information and could apply it in new situations only when it held a connection for them to their world of experience (Dewey, 1938).

During the Reform Pedagogy Movement in Germany and Austria, many educators developed new schools based on similar ideas to Dewey's. Georg Kerschensteiner, to mention one of those whose ideas have survived and who parallel both Dewey and the modern discussion most closely, is often considered the father of modern German vocational schooling, and his firm conviction that tasks for students should have a practical aspect and should fulfill a useful function is as relevant today as it was 150 years ago. They should, through careful planning and consideration on the part of both students and teachers, be suited to the materials and the situation at hand. Otto Haase, another contemporary in the Reform Movement, supported this view wholeheartedly; in his writings about the "People's School" (*Volksschule*), he wrote that students should create something, bring a project to completion, and should certainly not sit back and memorize. Tasks that were based on artificial or staged situations appeared to Haase neither conducive to real learning nor truly beneficial for students (Frey 2002).

Since the era of Dewey and the Reformists , countless others have bemoaned the deficit of experience in education, have proposed new theories of education and methods of teaching to close the gap, have tested out new types of classroom interaction -- and yet, somehow, traditional teaching methods still dominate classrooms. The words of Paolo Freire, written some thirty years after Dewey and over forty years before today, still resonate today with painful clarity: "Education is suffering from narration sickness." (Freire 1970, 52).

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 06 ISSN 1309-6249

REASONS FOR THE DISCONNECT

With such a history, it is easy to see that the complaints of educators, students and prospective employers about the practical irrelevance of today's education system are neither new nor particularly surprising. What is surprising -- and perhaps disturbing -- is that, despite over a century of discussing the problem, of proposing new ways to eliminate it or to at least soften its impact, of studies and evidence repeatedly showing that the systems we have are inadequate for students' needs, their basic structure has not yet significantly changed. And this begs one very simple question: Why?

Any answer to this question must ultimately be a form of speculation. However, possible answers can perhaps offer ideas of where stumbling blocks lie in the way of change, and how they could be circumvented.

One possible answer can be found in the furor unleashed by the results of international comparative standardized studies, most notably PISA. In the field of education, we talk about the often-unhealthy pressure on students to succeed in competition with their fellow students; we have now managed to apply this pressure to entire national school systems through the international scorn and ridicule heaped on those countries who compared unfavorably to their neighbors.

Large-scale international examinations are only one level of this phenomenon of standardized testing; it is also to be found at national and regional levels with varying degrees of influence. Due in large part to this pressure to succeed -- a pressure, mind you, that educators and parents frequently decry in small-scale settings -- we have teachers and schools determined to prepare students for the test, raise scores, and prove themselves against their contemporaries (their rivals?) in other countries or districts. This results in that four-letter phrase "teaching to the test", which is clearly not in any way conducive to the sort of open, experiential learning that is lacking in our educational systems. Rather, teaching to the test promotes rote memorization, testing strategies, and sometimes in extreme cases, learning how to "game the system" to improve scores without improving students' minds or abilities at all. Standardized testing naturally has its uses as well as its problems, and the results can be valuable spurs for change; a critical look at the reaction to test results in the last 10 years, however, offers clear indicators of their role as a constraining factor in school practice.

There are, of course, also factors external to the educational sphere that place limitations on teachers and curricula. One of these is, quite simply, the exponentially expanding rate of new information in the world. In today's world, every day brings with it new discoveries, refutations, technologies, applications and perspectives. Our level of knowledge is, at the moment, roughly doubling every ten years, and this rate will most likely only increase in the coming decades (Melezniak 1999). This puts educators in the difficult position of having to decide what, out of this vast wealth of information, students actually need to learn in order to be successful in their later lives. 200 years ago, it was unthinkable that an educated person could leave school without at least a basic command of Latin; nowadays, we regard the ability to read Latin as an interesting, but not necessarily useful skill (except in some specialist disciplines and by those students who have learned Latin, of course). Today, we expect students to have a basic grasp of national history when they leave school; will that still be considered a requirement in 100 years, or will history be forced out to make room for new subject matter that students "need"? It is difficult to say. That schools in Germany would see the necessity of offering courses in computer science, or that schools in America would consider it an obvious course of action to offer Japanese classes, would have boggled imaginations only 50 years ago; today, these courses do not even garner a raised eyebrow.

Because of this ever-expanding knowledge base, teachers are faced with an ever-expanding curriculum. The definition of what students "need to know" is changing rapidly, and many times teachers see themselves forced to reduce lessons to little more than memorization and repetition of countless facts simply in order to

cover all of the prescribed material; there is little doubt that grasping the significance of facts takes longer and requires more depth than simple memorization without deeper understanding. Whether this sort of "learning" can or should be classified as beneficial to students is at best questionable; it has, however, been shown that this sort of learning is not easily available for students to transfer later and does not promote the sort of trans-disciplinary skills, such as critical thinking, decision-making and an active attitude towards learning, that are far more important for later life than, say, facts about the functions of mitochondria in cellular biology (to take one particularly dry example from my own high school career).

Whether these facts are more or less useful than critical thinking skills, however, is beside the point for most educators in day-to-day practice. As long as teachers are given state- or nationally mandated curricula with material that "must" be covered, they are forced to focus on fitting their given material into one school year -- and classroom practice will suffer.

Although certainly part of the problem, these factors are, however, not insurmountable. A far more fundamental problem, and the focal point of our research, can be found before educators ever reach schools -- that is to say, before they ever officially become educators. As Frederking (1998) pointed out while describing the limitations of language-arts teacher education, teachers can teach only in a manner, and will only initiate learning processes, that they themselves have experienced. Here is yet another piece of evidence to support experiential learning -- theory about teaching cannot be transferred to classroom practice without the practically applied experience to sustain it. More importantly, it points to a glaring hole in teacher education: future educators are themselves frequently not capable of teaching in experiential learning contexts because they have never experienced this type of learning environment during their education.

This complaint is by no means new either. That teacher education is split into theoretical, academically presented content and practical phases in schools, and that the two are rarely, if ever, connected to one another, has been decried by education experts for decades. Nearly every study that discusses student opinions or evaluations of teacher-education programs on both sides of the Atlantic, in fact, discusses this as the most frequent and most pervasive criticism by students (Schaefers 2002, Zeichner 2009). Zeichner even quotes Linda Darling-Hammond (2009) as referring to this disconnect as the "Achilles Heel of teacher education".

Multiple German students, when asked to describe their studies, discuss creativity-stifling seminars where the wisest course of action is merely to "sit out" your time so that you can fulfill the necessary requirements, receive credit, and move on. As one teaching student put it, "Die studentische Hauptbeschäftigungen während eines Seminars sind: Tratschen, Schlafen, Lesen von Illustrierten, vom Projektor oder vom Tafel Abschreiben [...], Kreuzworträtsel-Losen, für andere Seminare Texte vorbereiten usw[1]." (Frederking 1998, 220) Based on my studies, concluded almost 15 years later, I would add "writing on the Facebook wall of the person sitting two seats away from you" and "playing online games on a laptop or Smartphone" to the top of that list; despite these digital updates, however, the trend remains clear: learning, if it takes place, isn't happening in education seminars -- despite the help of the much-vaunted "new media" to which the majority of students now have access. Another student, discussing the impressions formed at the start of his program, points out, "Seminare [...] sorgten dann aber schnell für Ernüchterung. Schon nach wenigen Wochen wurde mir schmerzlich klar, daß die Lektüre eines pädagogischen Fachbuches in dem heimatlichen Zimmer bei weitem effektiver ist als der

[1] "The primary student activities during a seminar are: gossiping, sleeping, reading magazines, copying down what's been written on the board or from the projector [...], solving crossword puzzles, preparing texts for other seminars, and so on." (Frederking 1998, 220, translation mine)

Besuch solcher Veranstaltungen[2]" (Frederking 1998, 151). Several also specifically discuss the total lack of preparation offered by these seminars for later work in the classroom.

It would be easy to dismiss such observations as coming from a few discontented students, or perhaps to dismiss the problem as one affecting the German educational system, without being more widely applicable. Among those teachers and university instructors of my acquaintance who have experience with student groups from different countries, German students are admittedly notorious for not participating and for merely sitting out their classes; any one of those instructors will say that it is a Sisyphean task to motivate German students to make a contribution to a discussion, or even to nod or shake their heads in answer to a question. This must then, to some extent, relativize their complaints about the uselessness of seminars.

However, there is a structural problem here as well, one that cannot be traced back to the students. If these seminars are so constructed that students are given no other task than that of sitting around and (perhaps) copying information from the board or the overhead projector (an activity which has in any case declined sharply thanks to the introduction of uploadable, printable PowerPoint slides), then can we blame students for not taking an active role in these classes? Is it any wonder that these students later, when standing in front of their own classrooms, will conduct similar lessons? How can we demand student-centered learning in schools when we utterly fail to provide it for future teachers in universities?

Even American students, who, at the other end of the spectrum, are somewhat notorious for an excess of the participatory enthusiasm that German students lack, nonetheless complain about a lack of practical use for the information and knowledge they acquire in university seminars. As Darling-Hammond notes, "Traditional versions of teacher education have often had students taking batches of front-loaded course work in isolation from practice and then adding a short dollop of student teaching to the end of the program -- often in classrooms that did not model the practices that had previously been described in abstraction" (Darling-Hammond 2006, 307). Zeichner also notes that "prospective teachers are supposed to learn theories at the university and then go to schools to practice or apply what they learned on campus" and goes on to say that one of the "perennial problem[s] in traditional college- and university-sponsored teacher education programs has been the lack of connection between campus-based, university-based teacher education courses and field experiences" (Zeichner 2009, 90-91). The opportunity to gain theoretical knowledge of educational theory and teaching methods is provided; opportunities to practice are, while rarer and usually somewhat haphazardly distributed, also provided. What is entirely missing is the connection between the two, the interaction between theory and practice, and how one can be integrated into the other.

Here are two major structural deficits that appear common to the vast majority of teacher education programs on both sides of the Atlantic: the structure of university teacher education, and the lack of connection between that university education and practical experiences in the field. How, then, can these deficits be overcome?

CONSEQUENCES FOR TEACHER EDUCATION

Why the Simple Answer Isn't So Simple

The answer seems fairly clear -- a restructuring of education seminars to make them more practically oriented, together with much tighter integration of field experiences and academic content. Implementing this simple-sounding solution, however, involves a wealth of complications. Many of these complications are addressed by Zeichner (2009) and Darling-Hammond (2006, 2010), but most of them are familiar to teacher educators the world over.

[2] "Seminars [...] quickly took care of bringing us back down, however. After only a few weeks, it became painfully clear to me that reading a textbook on educational science in my room at home was substantially more effective than attending such seminars." (Frederking 1998, 151, translation mine)

It seems like an indisputable fact that students who wish to become teachers need practice in the classroom. Darling-Hammond points out that new teachers who have not had an opportunity for some type of student teaching and who lack relevant coursework leave teaching in their first year at double the rate of better-prepared new teachers with both (Darling-Hammond 2010, 37). Yet, for some reason, student teaching tends to form only a minimal portion of teacher education[3], and tends to be entirely disconnected from the academic content students are expected to acquire beforehand. The result is that field experiences usually end up being something of an afterthought, rather than an integral part of the curriculum.

Additionally, as noted by multiple authors (including the author of this paper), there tends to be a distinct information gap between universities and the schools in a community. Zeicher sums this up as follows:

> ...it is very common for cooperating teachers with whom students work during their field placements to know very little about the specifics of the methods and foundation courses that their student teachers have completed on campus, and the people teaching the campus courses often know very little about the specific practices used in the P-12 classrooms where their students are placed (Zeichner 2009, 91).

When students do have the opportunity to enter classrooms, what they see rarely corresponds to what they have learned in the university. Their mentors/supervisors in schools do not act according to the principles that their university instructors have emphasized as important, and student teachers in any case rarely have access to the thought-processes of their mentor teachers (Zeichner 2009, 91) and so must attempt to reconstruct the logic behind a lesson-plan (assuming there is one) for themselves. Also in many cases, student teachers are an additional burder for teachers who already have their hands full with a normal class schedule and little to no interest in actively examining their own teaching practice, as noted by several students in Frederking (1998). In the worst case, as described to one of the authors by colleagues at her former school, veteran teachers are occasionally actively hostile to student teachers who come into a settled environment with new ideas and new methods to try out, regarding them as troublesome upstarts who disturb the working order with the latest teaching fad. In such a situation, the information gap between universities and cooperating schools is not merely inconvient, but rather becomes an active source of problems.

In most teacher education programs, few attempts are made to bridge this gap, and when attempts are made, they most often involve university instuctors attempting to bring their expertise into schools to improve practice (Zeichner 2009, 90); the expertise of practicing teachers is here usually entirely neglected. One reason as to why is the simple, almost painfully obvious truth stated by Boud: "The practical and the applied do not tend to have the same status in educational instituitions as the academic and the abstract" (Boud 1989, cited in Hansen 2000, 24). This also explains the typically underrepresented and comparatively neglected proportion of teacher education given to student teaching -- academic teacher educators see academic teacher education as more important and more valuable than practical experience; therefore, it receives comparatively more time and attention during teacher education. That this is the case despite numerous bodies of evidence supporting experiential learning processes in general and the value of well-integrated student teaching in teacher education in particular, is a clear indicator of a necessity for change.

There are also structural barriers within university systems that make implementation of such far-reaching, well-coordinated programs difficult. Darling-Hammond (2006) notes such problems as the "challenges [to] traditional program organizations, staffing, and modes of operation", including "departmental divides,

[3] This is the case in the majority of full-time teacher education programs; many fast-track teacher programs, such as those common throughout Germany and the United States, put new teachers directly in the classroom after only a few weeks of coursework and entirely skip over any form of student teaching beforehand; it is assumed that these fast-tracked teachers will "pick up" what they need on the job or in seminars attended during their first two years of teaching.

individualistic norms, and the hiring of part-time adjunct instructors in some institutions that have used teacher education as a 'cash cow' rather than an investment in our nation's future" (Darling-Hammond 2006, 306). More problematic than existing structual barriers, however, is the inertia of years of of habit, which for many colleagues cannot be overturned overnight to create entirely new structures and systems. Schaefers (2002) discusses at length the fact that almost all of the instructors in teacher education freely acknowledge the deficits of the system and regard suggestions for improvement positively. As she also points out, however, only a very few trouble themselves with the enormous effort of actively implementing said suggestions; many others remain complaisantly indifferent.

A Less Complicated Solution

There are multiple solutions to this problem. Zeichner (2009) and Darling-Hammond (2006) describe programs designed to more closely connect schools and universities and to ensure that teaching students have the necessary support they need while adjusting to the classroom. Some universities have even established campus-based laboratory schools, where the principles described in seminars can then be directly modeled in the classroom, or professional development schools, which are specifically designed to teach concrete skills and provide students with the tools they need to be sucessful in the classroom. Many programs hold one or more methodolgy courses on-campus in elementary or middle schools in an attempt to bring teaching students closer to their future professional environment. Zeichner (2009) and Schaefers (2002) both briefly describe university courses which integrate co-current student experience in schools and how these courses directly connect student teaching experiences with the theoretical concepts learned in classes; both also discuss the overwhelmingly positive responses to these courses from student teachers.

Such programs are all excellent examples of possible measures to solve the problems in teacher education discussed above. Unfortunately, they all require a staggering amount of work to implement and demand intense and focused cooperation between community schools, their teachers, university-based teacher educators and program administrators (not to mention the teaching students themselves). The are also the absolute exceptions to the rule, with such programs being praised to the skies as innovative, creative, and making vast strides towards improving teacher education -- thus, as anomalies. While not impossible to overcome, the various factors involved in the creation and maintenance of such programs, as we have already discussed, can stymie even the best-intentioned reform efforts.

Another possible solution to this dilemma has been finding increasing prominence in Germany in the last few years: the integration of so-called "Schülerlabore" (literally: pupil laboratories) into the university teacher education curriculum. These laboratories provide an extrascholastic place of learning for students from primary school up to (in some cases) post-secondary vocational education where students can experiment and supplement the theoretical knowledge gained in school with practical, hands-on experiments. The labs are frequently attached directly to universities or museums, or they are community-based spaces that can work in cooperation with local universities; because of these affiliations, they typically have facilities which are substantially superior to normal school science labs as well as multiple staff members to supervise and support students, and they offer a variety of educationally prepared experiments and activities which can then be integrated into a normal school curriculum.

Various universities across Germany (as examples, we can mention here Braunschweig, Berlin, Heidelberg, Würzburg, and Paderborn) have taken advantage of the opportunities offered by these extrascholastic learning environments and have offered teaching students the chance to work as the supervising personell with school classes from different levels. In some cases, teaching students also have the chance to design the hands-on, student-centered experiments that are on offer in the labs, as well as supervising and assisting visiting school classes. This experience in the laboratories is then directly coupled with university supervision and, in many cases, a seminar specifically tailored to reflecting upon the teaching practice gained at the labs.

This approach has a variety of advantages in its implementation. Because most of these laboratories have a variety of experiments on offer, interested school teachers can select an experiment that fits into their school curriculum and can bring their classes to the labs at a convenient point in the school year (the majority of the experiments are designed with the state-mandated curricula in mind, so that it is exceedingly rare that an experiment is offered that in no way fits into a school year). This is in direct contrast to most school placements, where teaching students are arbitrarily placed in a school for a few weeks during the school year (most commonly during university vacations, which are not always the same as school vacations) and must integrate themselves into the already-exisiting lesson structure. Their cooperating teacher must frequently re-plan and redesign so that teaching students have a chance to hold their own lessons, and the lessons planned by the teaching student must then also be adjusted to fit not only the curricula, but also the level and conditions of a specific class.

The cooperating teacher is also expected to observe, evaluate, and offer feedback to the student teacher. No matter the circumstances, it is a rare student teacher who is not in some way an added burden to his/her cooperating teacher; whether that cooperating teacher is willing or even glad to provide this guidance and support is here beside the point. In the laboratory setting, the student teachers neither require nor expect help from the classroom teacher; the experiments are designed to be carried out by school classes, and the student teachers are there to aid as necessary, while the classroom teacher is welcome to participate or not, as he/she chooses. Observation and feedback regarding the student teacher can be provided by a university supervisor and/or other student teachers; if the classroom teacher wishes to offer comments, these are typically welcome and integrated into the rest of the reflections, but he/she is under no obligation to do so.

The laboratories also offer a secure space for teaching students to practice without worrying about consequences, which often necessarily accompanies such practice in schools. When in schools, there is often a good deal of pressure on the student teachers because of many of the factors mentioned above, such as time constraints, adjusting one's lessons to the curriculum, and the pressure of coming in as an "outsider" and a beginner into a community of teaching experts (not to mention the fact that, should everything go horribly wrong, the student teacher will frequently still have a week or more of their internship with the same classes and colleagues who have witnessed said failure). In the lab, student teachers have the chance to gain experience with school classes from all levels and school types in a low-stress environment, where their teaching role is designed to be one of helper and facilitator, rather than as the source of knowledge and the director of all activity (as is the structure of many school lessons). By the very nature of repetitive practice, or due to the fact that the students have designed the lessons themselves, they are also frequently comparative experts on the topic being presented, which is not always the case when teaching one-off lessons in schools on a subject demanded by the curriculum and by the time of year. As the classroom teachers have sought out the particular experiment that their classes will take part in, student teachers do not have to consider how or whether it fits into the curriculum; as they are not familiar with the class or with what the class has done until that point in the year, they are also not responsible for designing a lesson to correspond exactly to what has been done in the classroom. Admittedly, this last point can be a disadvantage in that the knowledge and skills of the participating class are also unknown. However, well-designed experiments based on principles of task-based or experiential learning should cater to a variety of ability levels, and student teachers thus receive a chance to see the variation between different classes or different schools that are ostensibly at the same "level". And, should everything go horribly wrong, they can be comforted in the knowledge that the class and the accompanying teacher will disappear at the end of two hours. They can then analyze what went wrong in detail with the university supervisor and their peers, what could be improved, and then try again with an entirely different class with whom they have no negative history.

It goes almost without saying that, in addition to the advantages for student teachers that set laboratory experience apart from school-based field experiences, there is also the advantage, similar to school-based student teaching, of gaining concrete experience interacting with a broad variety of classes from different

levels and school types and having a chance to put the didactic concepts learned at the university into practice. Almost without saying -- but not quite. The importance of classroom (or, in this case, laboratory) practice cannot be emphasized enough. In this setting, the student teachers also have the time and necessary mental space for the complete cycle of planning -- teaching -- reflecting that is crucial for long-lasting and signficant learning. They have the time and opportunity to plan their actions, to put that plan into action, to reflect on the experience, and then to let the results of that reflection flow into the next round of planning and action, thus supporting their learning in exactly the ways that have been shown, both through studies on experimental learning and from students' own accounts, to be most effective.

In addition to the advantages for student teachers, there are also advantages for university programs in such a concept. Rather than entirely restructuring their teacher education programs, the supervision and/or construction of units for the labs can be integrated into existing didactic requirements -- in the case of the German system, this can be integrated into the content pedagogy courses required of all teaching students, as in the examples we will look at shortly. This also has the added advantage of making the didactic concepts under consideration subject-specific; a didactic seminar for future chemistry teachers, for example, can focus on didactic concepts that are particularly well-suited to chemistry lessons and to the age groups of those students most likely to have chemistry as a school subject.

The problem described by Schaefers (2002), that very few instructors are typically willing to make the effort to implement substantial changes to the university curriculum (although many regard such attempts with uninterested approval), does not apply here, for the simple reason that not all university instructors would have to participate in such a program concept. Only the motivated few would be required, in order to offer the accompanying seminar and to provide the supervision and feedback of a university advisor -- and, since the accompanying seminar could be integrated into exisiting didactics courses, the effort required would not that much more appreciable than current offerings require.

The massive coordination efforts between school and university are also substantially softened when this interaction is mediated by the laboratory. The classroom teacher is not required to supervise or offer feedback to the student teacher, so there is no pressing need for him/her to know what is being done in the university coursework; if his/her teaching does not model the practices or theories desribed in the seminars, it makes no difference to the student teacher who does not see it. The student teachers are not observing a classroom, where there may be little, if any, resemblance to the practices described in their seminars; rather, they themselves are teaching and can concentrate on putting their theories into practice.

Coordination between schools and the laboratory is essential, of course, so that classroom teachers take advantage of the opportunities offered by the lab; however, this coordination is often easier to secure than more extensive cooperations, primarily because it represents a one-time experience for a class, rather than weeks of accomodation. Many more teachers are glad to trade one afternoon in return for an extraordinary experience for their class than are glad to re-adjust their lesson plans, teaching styles, and time management for three to four weeks on end, or every Thursday for half a year. In addition, in many cases the laboratories offer facilities, equipment, or materials that are simply not available in schools, thus providing an additional draw for teachers in the chance to carry out activities they could not under normal circumstances. (For an overview of studies done on classroom teachers' opinions of visits to extrascholastic learning environments, see Klaes 2007.)

Although there are some disadvantages to this model, a few of which we have addressed here, they are far outweighed by the obvious advantages -- for teaching students, classroom teachers, and university program instructors and administrators. More importantly, here is a comparatively feasible way to close (or at the very least materially narrow) the perennial gap between theory and practice in teacher education via experience in the field, in direct interaction between student teachers and the classes they will later teach.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 06 ISSN 1309-6249

PILOT PROGRAMS

As mentioned in the last section, this is a concept that in the last few years has gained and is still gaining popularity in Germany. This is due in part to the popularity and prevalence of extrascholastic learning labs in that country (for an overview of German learning labs, see www.lela.de), but even when labs are not available or when they do not fit the desired requirements, universities have created their own to serve the needs of student teachers (for example in Braunschweig and Paderborn). In an effort to show what such programs could look like, some of the existing pilot concepts from German universities will be briefly introduced here.

Würzburg

The University of Würzburg is home to the "MIND-Center", an interdisciplinary coordination point for teacher education and education research. Within the MIND-Center, various subject-specific didactic departments, such as chemistry, computer science, and biology, have congregated around the focal point of the center: the Teaching-Learning-Lab (Lehr-Lern-Labor), also known as L^3. This is an extrascholastic learning lab such as we have already described, in which school classes can carry out experiments on a variety of topics. They are supervised and aided as necessary by student teachers from the university.

Within the physics department[4], all teaching students are required to take two courses related to the L^3, one for subject-specific pedagogy and one that directly accompanies a stint working in the lab. These two courses are intended to take place in subsequent semesters, meaning that students receive the theoretical basis that they need in their pedagogy course, such as teaching methods and theories of learning, and can then directly apply these theories in the following semester in the lab. The students either develop the experiments for the lab themselves, or they can modify and optimize existing units. The student teachers then accompany classes or small groups of students roughly 6-12 times over a period of 1-3 weeks as they carry out the experiment. Directly after each round, they receive concrete feedback on their teaching style, their integration of the methods and theories discussed in class, and their interaction with their group, which they can then reflect on and apply in their next round of teaching.

Particularly important hereby is the fact that the experiments are designed so that the participants should be able to complete them *without* needing extensive help from the student teachers. This means that, not only do student teachers gain valuable experience in interacting with school students when they do help, they also gain valuable experience in how to keep themselves in the background -- not only gaining through their own experiences, but learning how to make experiential learning possible for their classes later on. In the case of the MIND-Center, teaching students are confronted with classes from all different age groups and school types, thus providing them with an opportunity to gain experience across a broad spectrum of possible learning types.

The stated goal of this concept is an improvement in the professional competence of the teaching students, and the results from the first preliminary studies of the L^3's impact have consistently been positive (Völker 2011). In feedback evaluations, students specifically cited the practical relevance of their work in the lab for their future profession and the fact that the transfer of theory to practice is not to be learned in the academic classroom alone. Via a self-evaluation, every single one of the students estimated their own "teaching competences" (for example, time management or creating worksheets) as being markedly improved at the end of the seminar, and every one assessed the seminar as a distinct possibility for improving the quality of teacher education.

[4] All descriptions of the L^3 and the course of studies described here go back to Völker and Trefzger (2010/2009). The descriptions here refer to the newer modularized program and not to an earlier version of the seminar/lab cooperation, although the two concepts are similar.

Heidelberg

Somewhat differently organized, but with a similar goal, is the work done in the science-live! laboratory in Heidelberg in cooperation with the Pädagogischen Hochschule. Here, teaching students (also from the hard sciences) spent up to 2 years wroking in science-live! with groups of students. Here, in an effort to extend the princples of creative problem solving and experiential learning the participants could to some extent design their own activities, so that more support from the teaching students was required; this, of course, highlighted the student teachers' ability to step back and allow the participants to experience without input, as one of the focal points of the students' theoretical training. The student teachers were expected to provide methodological and expert support, but were strongly discouraged from otherwise directing the learners[5].

Their work was not directly connected to a seminar in the university; rather, each student teacher had intensive personal supervision from a university instructor and multiple evaluation and reflection points over the course of their work. They produced portfolios documenting their behavior, their opinions, and their beliefs about teaching, as well as the systematic reflections that had an effect on those factors. Additionally, their work in the laboratory was periodically videotaped to be more closely reviewed and analyzed together with their university supervisor.

At the end of the two years, the materials were analyzed to determine whether an increase in "professional competences", as defined beforehand (Leonhard 2008) had been achieved. Rather than relying on self-evaluations, Leonhard and his colleagues evaluated the students based on a validated competence rubric to determine whether such professional competences as reflection, self-control, and self-direction had improved over the course of their work. In order to validate the results, the materials were also given to colleagues familiar with the competence rubric but not with the study to see if the evaluations were comparable.

Because of the incredibly small sample size (n=3) and the mixed results from one subject to the next (and, to some extent, from one evaluation to the next), it is difficult to draw conclusions about the effectiveness of this concept. However, on a subjective level, every one of the student teachers involved rated the combination of work in the lab together with intensive supervision and reflection as highly effective -- much more so than their "regular studies". Leonhard points to an improvement in competence as well, but whether or not an improvement can be measured, it is clear that work in the labs provides valuable experience for students on an affective level, increasing their self-confidence in their own abilities as well as their ability to see the connection between work in a classroom setting and the reflection and theory offered in the university. It constitutes a decided improvement over the normal course of studies -- one that is highly regarded by the students.

Paderborn

In the Erfinderwerkstatt (Inventors' Workshop) of the University of Paderborn, a small extrascholastic learning lab located in the university, teaching students for vocational schools have the chance to plan and carry out teaching units for apprentices or students in full-time vocational education during two classes offered by the department for the Didactics of Technology. The students are asked to design tasks that offer experiential learning opportunities for the apprentices, and they then accompany and support the apprentices while they solve problem-oriented task descriptions.

The vocational school curriculum in Germany specifically describes task-based, experiential learning methods as the prescribed method to be used in vocational education and as an integral part of the educational mission of the modern vocational school. Therefore, the focus in the two courses specifically aimed at future vocational

[5] All information here about the science-live! lab and its work together with the PH-Heidelberg goes back to Leonhard (2008).

school teachers is on the principles of experiential learning and learner-orientation -- how teachers construct task-based problems that allow a variety of solutions, how to promote creative problem-solving on the part of the learners, and, most importantly, how to let learners learn and experience for themselves without falling back into a "traditional" teacher's role: that of a director of the action who already knows the correct answer. The teaching students can then directly apply the theoretical principles in the two seminars when constructing their own problems for apprentices; they later have the opportunity to try out their teaching units with apprentices from a local vocational school and afterwards reflect on and evaluate the experience. The principles of experiential learning are therefore at work here on two levels: on the first level, the student teachers have the chance to gain experience in their future profession and to interact with their future students. However, they are not only gaining experience for themselves; they are also actively learning how to facilitate experiential learning in others. Here we see student teachers experiencing the way in which they are later expected to teach -- a point which we have already cited as being one of the biggest deficits in current teacher education models.

As the teaching students will typically only have one, or at the most two, afternoons with the apprentices to carry out their planned projects, it is difficult to speak here of an improvement in professional competence (although it is perhaps worth noting that students subjectively evaluated the experience as contributing to such an improvement). Nonetheless, according to the feedback collected afterwards from the students in an evaluative group discussion and in reflection papers, the course was seen as a valuable building block in teacher education. Each of the participants discussed the relevance for their later profession, the highly effective nature of the theory-practice connection, and the utter dissimilarity of the course to the other didactic courses attended at the university. The unique nature of the course was, in fact, for many of the students the key factor; this course was seen as one of the only courses where theory was directly connected to practice and where the course itself had practical value and a direct bearing on their development as teachers.

SUMMARY OF THE RESULTS AND CONCLUSION

That experiential learning is one of the most effective methods of learning cannot reasonably be overlooked in the face of the overwhelming supporting evidence. That it is not an especially common method in the classroom is something that therefore *should* not be overlooked. Rather, we should be asking why this is the case and what can we do to change it and to encourage future generations of teachers to teach more effectively.

In the course of this paper we have focused on the theory-practice weakness in most teacher education programs as a probable cause for this deficiency. While there are undoubtedly many solutions to this problem, these solutions are also frequently necessarily constrained by the implications of implementation. In an effort to work around these constraints, we have proposed one possible solution, the use of extrascholastic places of learning, that is currently being used with notable success in universities across Germany and described possible forms that an implementation of this concept might take. Clearly, this implementation will also face its share of difficulties, and no solution is perfect; we have for the most part omitted a discussion of the deficiencies in the pilot programs (such as the difficulties of objectively "measuring" competences) due to time and space constraints. However, in light of the unwavering positive feedback from students, as well as the advantages of this solution discussed above, it still seems an entirely feasible option -- more so than many other more elaborate solutions.

Whether teacher education instructors and administrators decide for or against our favored solution, however, is unimportant. What is important is that the gaping cleft in teacher education between theoretical material in universities and practical experience in schools is recognized and that something is done to bridge it and to provide student teachers with meaningful learning experiences, so that they can later return to the classroom

and provide such meaningful learning experiences for their own students. In the end, we cannot expect future teachers to teach their students something they have no experience of themselves.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 07 ISSN 1309-6249

A STUDY ON THE RELATIONSHIP AMONG SELF-MOTIVATION, ORGANIZATIONAL COMMITMENT AND JOB SATISFACTION OF UNIVERSITY FACULTY MEMBERS IN TAIWAN

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ABSCTRACT

The purposes of this study were first, to explore the faculty members' self-motivation to pursue in-service education; second, to examine the relationship between their job satisfaction and commitment; third, to understand the degree of job satisfaction and organizational commitment of teacher who are participating in continuing education and those who completed this experience; and fourth, to investigate any difference of job satisfaction and commitment to school between who participate in continuing education and teachers who do not participate in continuing education. The statistical methods employed, on the basis of research questions, descriptive statistics, One-way ANOVA, Person correction, *t* test, and stepwise multiple regression using the statistical software SPSS 16.0. Research questions were by a reliable and valid instrument base upon the results of a content validity test and a pilot test. A total of 122 university faculty members completely participated in this study. This study revealed that: the motivation of the teacher who participated in in-service education was high. Extrinsic motivation was greater than intrinsic motivation. Extrinsic motivation, such as "Go with trend" and "Incentive by school", were main factors influencing teachers who are participation in in-service education. The level of job satisfaction did not reach significant difference with continuing in in-service education. The difference between organizational commitment and continuing in in-service education was not significant. This phenomena seemed imply that their in-service education might not really focus on or improve organizational commitment. The faculty possessed higher organization commitment score, while they held the higher the level of job satisfaction. Also, this study found those faculty finished their academic degrees possessed higher organizational commitment than those faculty were pursuing their continuing education.

Key Words: Self-Motivation, Organizational Commitment, and Job Satisfaction.

INTRODUCTION

Statement of the Problem

In 1994, Taiwan's government deregulated education policy related to the management of higher education. As a result, many universities established new technology departments. In addition, most junior colleges upgraded to institutes of technology or institutes of technology upgraded to universities of technology (Lee, 2001). When junior colleges upgraded to institutes or universities of technology, the administrations confronted the serious question of how to employ teachers who met the higher degree requirements because the title of the majority of junior college teachers was Lecturer (Chang, 2002). According to information issued

by the Ministry of Education (2005) about teachers employed by Private Institutes of Technology, titles of teachers who were in higher-ranking positions than Assistant Professor comprised more than 25 percent of the total full time teachers in institute of technology or 50 percent of the total full time teachers in universities of technology.

In the present stage of development of the educational system, most of the teachers employed full-time are lecturers. This is because the majority of institutes and universities of technology recently upgraded from junior colleges. Hence, many schools use two methods to increase the percentage of qualified teachers. One is to preferentially hire teachers who are qualified to fill a position with a title of at least assistant professor. Another is to encourage lecturers to participate in in-service education to obtain higher degrees. Many lecturers have no choice but to obtain a higher degree in order to keep their jobs. The constantly changing environment is forcing adjustments in the organizations' culture.

Motivation is a very important causal factor in human behavior. This study will focus on the teachers' motivation for continuing in-service education and the relationship to job satisfaction and organizational commitment. Lundblad (1994), and Brown (2002) concluded that there is a positive correction between motivation and job satisfaction. Dramstad (2004) found that the correlations between job satisfaction and organizational commitment are positive. Organizational commitment means "a sense of teacher loyalty to the school workplace and identification with its values and goals" (Mowday, Porter, and Steers, 1982, p.226). Organizational commitment has been identified as an important aspect in understanding the work behavior of employees in organizations (Meyer & Allen, 1991).

Purpose of the Research

The purposes of this study are:

1. To examine the individual's motivation to pursue a higher level of qualification.
2. To examine the degree of job satisfaction of teachers who are participating in continuing education and those who have completed this experience.
3. To examine the degree of commitment to the employing school for those who participate in continuing education.
4. To examine the relationship between job satisfaction and commitment of teachers who participate in continuing education.
5. To examine any difference in job satisfaction and commitment to the school between teachers who participate in continuing education and teachers who do not participate in continuing education.

Importance of the Study

It is a necessary condition of successful teaching for teachers to unceasingly participate in in-service education and increase specialized growth. Many institutes and universities of technology encourage the lecturer to participate in in-service education to obtain a higher degree in order to improve teacher quality. This study is important for the following reasons:

1. Understanding the motivation of the teachers participating in in-service education may help school administrators to attract teachers who meet requirements.
2. Understanding the degree of job satisfaction may help the school managers improve the teachers' work environment.
3. Understanding teachers' commitment to the school may help the school superintendents adopt effective policies to reduce teacher turnover rate.

Questions for the Research

Given the above stated purposes of the research, the research questions in this study are:

1. What motivates teachers to want to participate in in-service education?
2. What are the present levels of job satisfaction for teachers who participate in in-service education?

3. What are the present levels of organizational commitment to the school for teachers who participate in in-service education?
4. What are the correlations between organizational commitment, job satisfaction and motivation of teachers who participate in in-service education?
5. What is the difference between commitment and job satisfaction for teachers who participate in continuing education and teachers who do not participate in in-service education?

REVIEW OF THE LITERATURE

The literature review addressed the theory basis and research issues that served as the conceptual framework for this study. This review includes three parts: (1) a review of the literature on teachers' in-service education motivation and other related research; (2) a review of the literature on teachers' job satisfaction and other related research; and (3) a review of the literature on teachers' commitment to school and other related research.

Studies of Motivation Related to Teachers

Motivation can be separated into components, that of intrinsic motivation and extrinsic motivation. Gray and Starke (1988) proposed that extrinsic rewards (pay, promotions, compliments, etc) are independent of the task performed and are controlled by other people. Intrinsic rewards (a feeling of accomplishment of task that was interesting and challenging) are an integral part of the task and are administered by the individual doing the task. Therefore, extrinsic motivation results from anticipation of extrinsic rewards and intrinsic motivation results from potential intrinsic rewards.

Studies of Job Satisfaction Related to Teachers

Frederick Herzberg (1959) proposed that job factors be classified into two categories, motivators and hygiene. Herzberg found the determinants of job dissatisfaction to be company policy, administrative policies, supervision, salary, interpersonal relations, working conditions, and other extrinsic job factors.

Lester (1987) found many factors will affect work job satisfaction such as "advancement, autonomy, colleagues, creativity, pay, recognition, responsibility, school policies, security, supervision, work itself, and work conditions" (p. 225). Mullins (1999) defined job satisfaction as a complex concept and found that the level of job satisfaction is affected by a wide range of individual, social, cultural, organizational, and environmental variables.

Studies of Organizational Commitment Related to Teachers

Kushman (1992) stated that teachers' organizational commitment depended on certain working conditions existing in the school. These included: (1) a behavioral climate conducive to learning, (2) a motivational climate for the student, (3) involvement of the teachers in decision making, and (4) extrinsic rewards for the teachers (Norwood, 1997, p. 42).

Insim (2003) examined the effects of teacher empowerment on teacher commitment and student achievement. The findings were that rewards and professional development were positively related to teacher commitment.

METHODOLOGY

Research Structure

The research structure in this study was based on the literature review, the statement of the problem, purpose of the research, and research questions. With teacher demographics as the independent variable and in-service education motivation, job satisfaction, and organizational commitment as the dependent variables, the present

status and the relationships among the variables were explored. The research structure is graphically presented in Figure 1.

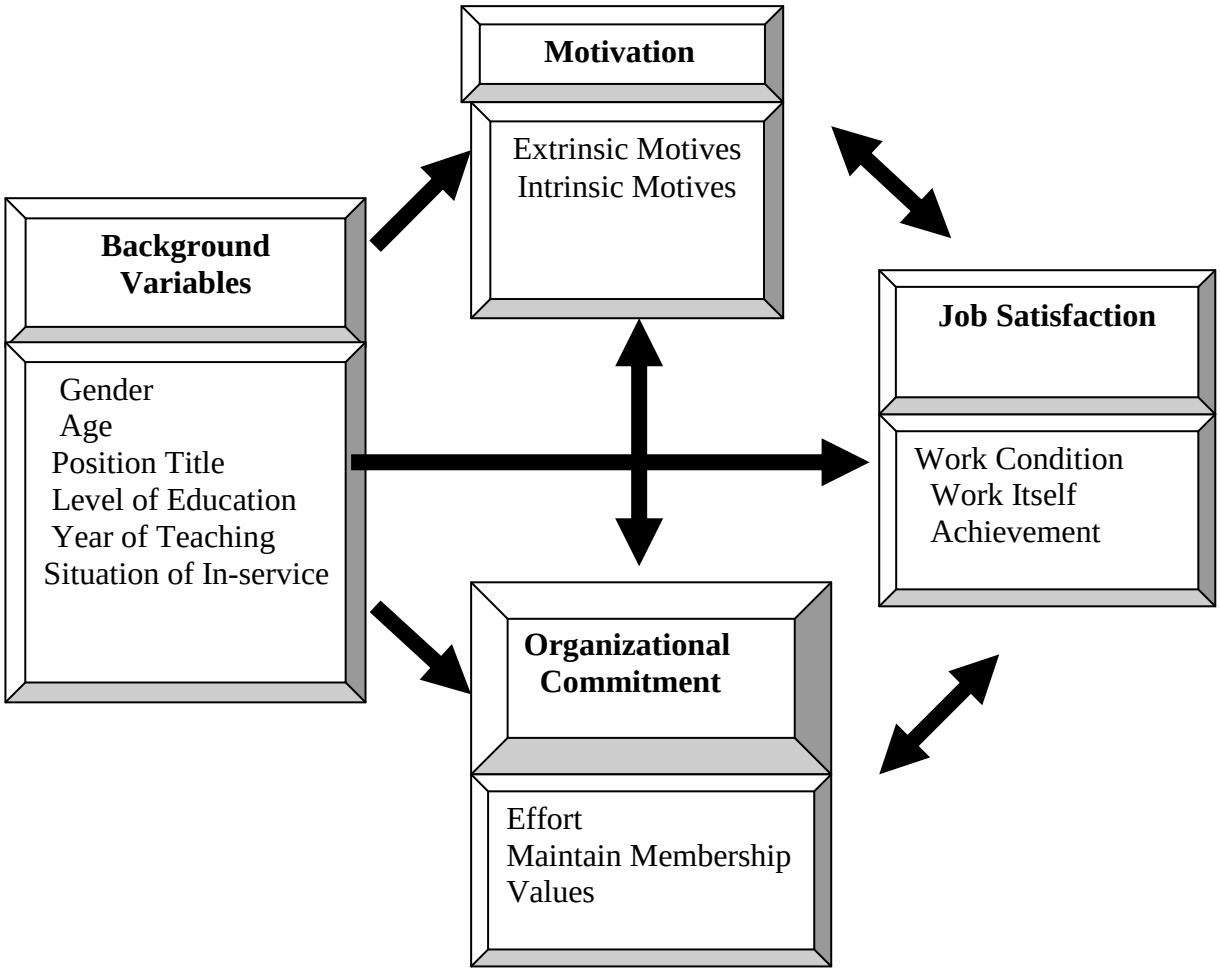

Figure 1: Research Structure

Population and Date Collection

The sample for this research was the faculty at the Overseas Chinese University. The head of each department was contacted to request cooperation. Then, the researcher contacted nine administrative assistants to secure their cooperation. The volunteer administrative assistant in each department followed the instructions to help distribute the survey instruments to selected subjects and collected the returned instruments in sealed envelopes from the subjects.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 07 ISSN 1309-6249

RESULTS AND ANALYSIS

Research Question One

Research Question One states: What motivates teachers to participate in in-service education?

The factors were determined by Pearson correlation analysis and stepwise regression analysis. A statistical relationship was found in overall motivation with regard to extrinsic motivation and intrinsic motivation. The results indicated that extrinsic motivation primarily influenced teachers continuing in in-service education. The coefficient of determination (R^2) showed that 85.04 percent of the variance of overall motivation was accounted for by its linear relationship with extrinsic motivation. Of the primary factors in extrinsic motivation, those with the highest ranking were "Go with trend", "Career advancement", "Incentive by school", "Raise" and "School requirement". The coefficient of determination (R^2) showed that 78.73 percent of the variance of overall motivation was accounted for by its linear relationship with intrinsic motivation. Of the primary factors in intrinsic motivation, the highest rated factors were "Family or friends encouragement", "Status and reputation", and "Improve knowledge".

Research Question Two

Research Question Two states: What are the present levels of job satisfaction for teachers who participate in continuing education?

The difference was analyzed by Student's *t*-test. The overall mean of teachers who are continuing in-service education was higher than that of teachers who completed in-service education. After Student's *t*-test, factors of work conditions, work itself, and achievement did not reach a level of significant ($p>.05$). This study indicated that there was not a statistically significant difference between job satisfaction and teacher participation in continuing education.

Research Question Three

Research Question Three states: What are the present levels of organizational commitment to the school for teachers who participate in continuing education?

The difference was analyzed by Student's *t*- test. The overall mean for teachers continuing in-service education was higher than for those who had finished.
After Student's *t*-test, effort commitment, maintain membership commitment, and value commitment did not reach a level of significant difference. This study indicated that there was no statistically significant difference between any of these factors.

Research Question Four

Research Question Four states: What are the correlations between organizational commitment, job satisfaction and the motivation of teachers who participate in in-service education?

The correlations were determined by Pearson correlation and stepwise regression analyses. There was a significant positive correlation between organizational commitment and job satisfaction. In three subscales for OCS and overall job satisfaction, the degree of correlation between maintain membership commitment and overall job satisfaction was more than for effort commitment and value commitment. In three subscales for JSS and overall commitment, the degree of correlation between work itself and overall organizational commitment was highest. This study indicated that the higher the organizational commitment score, the higher job satisfaction of teachers. The coefficient of determination (R^2) showed that 78.73 percent of the variance of overall job satisfaction was accounted for by its linear relationship with overall commitment. "This school really

inspires the very best in the way of my teaching" and "Deciding to work for this school was a definite good choice on my part" were the primary factors of organizational commitment that influenced job satisfaction.

Further, there was a significant correlation between organizational commitment and motivation of teachers who participate in in-service education. Among all subscales, the degree of correlation between effort commitment and overall motivation was highest. The degree of correlation between intrinsic motivation and overall commitment was more than that of extrinsic motivation and overall commitment. This study indicated that the higher the organizational commitment score, the higher the motivation of teachers participating in in-service education. "I am willing to put in a great deal of effort beyond that normally expected in order to help the school be successful", I am proud to tell others that I am part of this organization", and "This school really inspires the very best in the way of my teaching" were the primary factors of organizational commitment that influenced motivation for teachers participating in in-service education. "I find that my values and the school's values are very similar" was a negative factor for teachers participating in in-service education.

There was a significant correlation between job satisfaction and motivation of teachers who participate in in-service education. Among all subscales, the degree of correlation between work itself and overall motivation was highest. The degree of correlation between intrinsic motivation and overall job satisfaction was more than that of extrinsic motivation. This study indicated that the higher the motivation score, the higher the level of job satisfaction. "Incentive by school" and "Improve knowledge" were the primary factors of motivation that influenced job satisfaction.

The correlations among organizational commitment, job satisfaction, and motivation reached a level of significance. The correlation coefficient between job satisfaction and organizational commitment was highest. This study indicated that the correlation between job satisfaction and organizational commitment was greater than that of other factors.

Research Question Five

Research Question Five states: What is the difference between organizational Commitment and job satisfaction for teachers who participate in continuing education and teachers who do not participate in continuing education?

For organizational commitment, the overall mean of teachers who participate in continuing education was lower than that of teachers who did not. Results of the Student's *t*- test showed a level of significant difference between organizational commitment of teachers who participate in continuing education and those who do not participate in continuing education. This study indicated that the organizational commitment of teachers who participate in in-service education is less than teachers who do not.

In job satisfaction, the overall mean of teachers who do not participate in continuing education was greater than that of teachers who participate in continuing education. As shown by the Student's *t*-test results, there was no a level of significant difference between job satisfaction of teachers who participate in continuing education and those who do not participate in continuing education.

Based on stepwise regression, organizational commitment and job satisfaction were predictive of teachers participating in in-service education. The lower the organizational commitment score, the higher the teacher trend toward participating in in-service education. The higher job satisfaction score, the higher the teacher trend toward participating in in-service education. The results indicated that the factor "Effort commitment" was negatively correlated and a predicative variable.

CONCLUSIONS

This study revealed that: the motivation of the teacher who participated in in-service education was high. Extrinsic motivation was greater than intrinsic motivation. Extrinsic motivation, such as "Go with trend" and "Incentive by school", were main factors influencing teachers who are participation in in-service education. The level of job satisfaction did not reach significant difference with continuing in in-service education. The difference between organizational commitment and continuing in in-service education was not significant. This phenomenon seemed imply that their in-service education might not really focus on or improve organizational commitment. The faculty possessed higher organization commitment score, while they held the higher the level of job satisfaction. Also, this study found those faculties finished their academic degrees possessed higher organizational commitment than those faculties were pursuing their continuing education.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 08 ISSN 1309-6249

A CROSS-AGE STUDY ON HIGH SCHOOL STUDENTS' ATTITUDES TOWARD CHEMISTRY

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ABSTRACT

The purpose of this study is to investigate the effect of grade level on high school students' attitudes toward chemistry as a school subject. Attitude Scale Toward Chemistry developed by Geban & Ertepınar (1994) was administered to collect data. The sample of the study was composed of 197 high school students from different grades that ranged from Grade 9 to 11. Principal component analyses revealed two dimensions of the scale for this data set and these dimensions were labeled as "enjoyment" and "importance". Cronbach Alpha reliability coefficient of the scale was computed as .93. MANOVA results indicated that grade level had significant effects on high school students' attitudes toward chemistry as a school subject in terms of both enjoyment and importance dimensions. Post Hoc analyses revealed that there is significant mean differences between Grade 9 and Grade 10 students' attitudes toward chemistry as a school subject on both dimensions.

Key Words: Attitude toward chemistry, grade level, high school students.

INTRODUCTION

Attitudes, one of the constructs of the affective domain, have been searched deeply for more than 40 years (Aiken & Aiken, 1969; Koballa & Crawley, 1985; Koballa, 1988). The main reasons of conducting studies related to attitude are its potential to predict future behaviors like subject and career preferences of students (Koballa, 1988; Osborne, Simon & Collins, 2003), and due to the correlation that exists between attitude and academic achievement (Shrigley, 1990; Weinburgh, 1995; Osborne & Collins, 2000).

Accumulation of knowledge related to the importance of attitudes caused science programs to include science-related attitudes. One of the aims of Turkish secondary school science program, for instance, is to develop positive attitudes toward science (Ministry of National Education [MNE], 2007). Then, what is meant by apparently simple term "attitudes toward science"? Actually, the literature had scene of a debate related to the meaning of "attitudes toward science" and "scientific attitudes or attributes". Gardner (1975a) made a distinction between these two concerns as describing the latter as a scientific thinking and questioning strategy that can be treated under the cognitive domain (Osborne et al., 2003) whereas describing "attitudes toward science" as a learned tendency to evaluate in certain ways which is the aspect within the scope of the present paper.

Attitudes toward science is related to positive or negative feelings about scientific objects and enables to predict scientific attitudes (Koballa & Crawley, 1985). Schibeci (1983) argued that various objects can be related to attitudes like science lessons, scientists, science in real life, chemistry as a school subject, and etc. For example, students' attitudes toward chemistry as a branch of science and as a school subject may be different in nature and level. Moreover, some of the studies (Havard, 1996; Spall, Dickson & Boyes, 2004) pointed out that treating different branches of science lessons under the general heading (i.e. science) may cause deviated

results; that is, students may have varied attitudes toward chemistry and physics or any other branches of science.

Since attitudes are not the same for different objects and studies confirmed that attitude is a multidimensional variable (i.e. includes various constructs like importance and enjoyment) (Gardner, 1995), it is crucial to define the scope of the study, explicitly. The focus of the current study is on high school students' attitudes toward chemistry as a school subject in Turkey (Grades 9-11).

Besides defining and measuring attitudes, the attitude literature deals widely with the factors affecting attitude toward science. Grade levels (Hofstein, Ben-Zvi, Samuel & Tamir, 1977; Yager & Yager, 1985; Simpson & Oliver, 1990; Francis & Greer, 1999; George, 2006; Barmby, Kind & Jones, 2008), gender (Hofstein et al., 1977; Harvey & Stables, 1986; Francis & Greer, 1999; Barmby et al., 2008), achievement (Weinburgh, 1995; Salta & Tzougraki, 2004) are some of the mostly investigated factors affecting high school students' attitudes toward science. Results of the studies that dealt with attitude changes among students of different age groups are not in exact consistency as a result of various factors. Examining different constructs of attitudes may be one of the possible factor (Osborne et al., 2003). George (2006), for instance, showed that students' attitudes toward science declined whereas attitudes toward utility of science increased during secondary years. Nevertheless, Francis & Greer (1999) did not find any significant differences among 13-16 years students' attitudes about the importance of science. Apart from attitudes about the importance of science lessons, the attitude literature introduced also studies related to students' enjoyment of science lessons (Whitfield, 1979; Stables, 1990; Havard, 1996). Actually, enjoyment of chemistry, physics or biology was associated with gender differences in most of the studies. Stables (1990) found that girls have a tendency to biological sciences and males to physical sciences. Havard (1996) pointed out advanced level students in the UK and stated that the least enjoyable lesson is physics according to the students. On the other hand, Whitfield (1979) reported chemistry and physics as the least enjoyable subjects for post-14 English students.

The purpose of the present study is to examine students attitudes toward chemistry as a school subject over the Grade 9-11, in Turkey. The research question was addressed as follows:

- How do attitudes toward chemistry as a school subject change during Grade 9 through 11 of Turkish students?

METHODOLOGY

Sample

The sample of the study was assigned through convenience sampling method. The sample was composed of 197 high school students from different grades that ranged from Grade 9 to 11 (Years 16-18), from a public high school in Isparta, Turkey. 116 of the students were female and the remaining 81 of them were male. Table 1 indicates number of students with regard to their grade levels.

Table 1: Number of Students within each Grade Level

	Grade 9	Grade 10	Grade 11
Number of Students	83	36	65

Instrument

The Attitude Scale toward Chemistry (ASTC), developed by Geban, Ertepınar, Yılmaz, Altın & Şahbaz in 1994, was administered by the instructor during regular chemistry lessons. The scale consists of 15 items in 5-point Likert type that ranges from "Completely Disagree" to "Completely Agree". The items of the scale involve both positive (10 items) and negative sentences (5 items) in nature. The possible minimum score of a student is 15 and the maximum is 75. Lower scores show negative attitudes but higher scores, on the contrary, show positive

attitudes toward chemistry as a school subject. The reliability of the scale was found as .83 by the developers. However, the researchers computed the Cronbach Alpha internal consistency coefficient of the general scale as .93 for the present data.

Data Analysis

First of all, the items that are negative in nature were recoded. In order to check dimensionality of the scale, as suggested by Rennie & Parker (1987) and Gardner (1995), the Principal Component Analysis was used. The analysis pointed out two dimensions of the scale for the present data (details of the dimensions reported in the "Findings" section). Reliability analysis of both of the dimensions was computed. Finally, One-Way Multivariate Analysis of Variance (One-Way MANOVA) was conducted to test the research question. All of the mentioned analyses were performed by the use of SPSS.

FINDINGS

The results of the study were reported in two parts namely, findings from descriptive statistics and inferential statistics, respectively.

Findings from Descriptive Statistics

Results driven from descriptive statistics involves the Principal Component Analysis and the reliability analysis which were stated respectively. According to Stevens (2002), items that load on more than .40 are reliable as long as the sample size is above 150. As can be seen from Table 2, the items were loaded on two factors; that is, the ASTC involves two dimensions for the present data. The first dimension is made up of 8 items which are all above .638. The second dimension consists of 7 items that are above .454. However, the fifth, second, and fourteenth items were loaded on both dimensions. As a result, the contents of the mentioned items were checked and categorized in such a way that two of them were assigned to the first dimension (2nd and 14th items) and one of them was handled under the second dimension (5th item). The dimensions were named with regard to their contents and on the basis of the literature as "enjoyment of chemistry" and "importance of chemistry" (e.g. Dhindsa & Chung, 1999). Table 3 summarizes items that belong to one of the two dimensions.

Table 2: Rotation Component Matrix [a]

Items	Component	
	1	2
7	.855	
4	.848	
13*	.799	
9*	.796	
1	.788	
6*	.763	
15	.724	
8	.638	
10		.803
12		.778
3*		.691
11		.667
5	.459	.622
2	.430	.551
14*	.403	.454

[a:] Rotation converged in 3 iterations *: Recoded items

Table 3: The Items of the Dimensions of the ASTC

	Enjoyment of Chemistry	Importance of Chemistry
Items	7, 4, 13, 9, 1, 6, 15, 8, 2, 14	10, 12, 3, 11, 5

The Cronbach Alpha internal consistency coefficient is a useful statistics for deducing that students did not respond items of the scale randomly (Fraenkel & Wallen, 2006). The reliability coefficients were computed for each dimensions and the whole scale as general. The Alpha values are found as .92 for the "enjoyment of chemistry" , .81 for the "importance of chemistry", and .93 for the whole scale. George & Mallery (2003) declared that Alpha values greater than .9 is excellent and greater than .8 is good. The "importance of chemistry" dimension has a good internal consistency, on the other hand, the "enjoyment of chemistry" and the whole scale have excellent internal consistencies. The number of items in the "importance of chemistry" is less than the other dimension which may be the cause of smaller Alpha value whereas it is also above the acceptable level.

Findings from Inferential Statistics

In order to test the effect of grade level on enjoyment and importance dimensions of attitudes toward chemistry as a school subject, One-Way MANOVA was performed after meeting assumptions that were normality, homogeneity of variance-covariance matrices and independence of observations. The hypothesis tested was introduced in its null form, as follows:

H_{o1}: There is not a significant mean difference on the enjoyment and importance dimensions of the attitudes toward chemistry as a school subject over the Grade 9 to 11 students in Turkey.

The results of the One-Way MANOVA indicated a significant mean difference on the overall enjoyment and importance dimensions of the attitudes toward chemistry as a school subject across Grade 9 to 11 (Wilks' Lambda=0.948, F (4, 360)=2.44, $p<0.05$). Table 4 involves data necessary to comprehend the effect of grade level on the enjoyment and importance dimensions of the attitude separately.

Table 4: Relationships Between Dimension Means and Grade Level

Dimensions	Grade Level			*F*	Sig.	*η2*
	Grade 9 Mean	Grade 10 Mean	Grade 11 Mean			
Enjoyment of Chemistry	33,843	29.111	32.138	3.950	.021	.042
Importance of Chemistry	17.325	15.694	16.708	3.874	.023	.041

The significance value for the enjoyment dimension (.021) is smaller than .05 which means that there is a significant mean difference on the enjoyment dimension. Similarly, the significance value for the importance dimension (.023) is smaller than .05 that means there is a significant mean difference on the importance dimension of the attitudes toward chemistry as a school subject across Grade 9 to 11.

Furthermore, Table 4 can be used to deduce important information related to the means of each grades on both of the enjoyment and importance dimensions of attitude towards chemistry as a school subject. The highest mean score belongs to Grade 9 students (33.843) and the lowest one belongs to Grade 10 students (29.111) in terms of the enjoyment of chemistry. Similarly, the highest mean score belongs to Grade 9 students (17.325) and the lowest one belongs to Grade 10 students (15.694) with respect to the importance of chemistry.

Table 5: Post Hoc Tests (Bonferroni)

Dimensions	(I) Grade Level	(J) Grade Level	Sig.
Enjoyment of Chemistry	Grade 9	Grade 10	.017
		Grade 11	.676
	Grade 10	Grade 9	.017
		Grade 11	.260
	Grade 11	Grade 9	.676
		Grade 10	.260
Importance of Chemistry	Grade 9	Grade 10	.019
		Grade 11	.624
	Grade 10	Grade 9	.019
		Grade 11	.300
	Grade 11	Grade 9	.624
		Grade 10	.300

Table 5 shows significance values among grade levels on both of the enjoyment and importance dimensions which gives results related to the separate grade levels. As can be seen from Post Hoc analyses, there is significant mean differences between Grade 9 and Grade 10 students' attitudes toward chemistry as a school subject on both enjoyment and importance dimensions.

DISCUSSION AND CONCLUSION

The present study has marked a significant mean difference on attitudes toward chemistry as a school subject across Grade 9 to 11. More specifically, students' attitudes changes across grade levels in terms of both "enjoyment of chemistry" and "importance of chemistry" constructs. Furthermore, in-depth analysis indicated that there is significant mean differences between Grade 9 and Grade 10 students' attitudes toward chemistry as a school subject on both enjoyment and importance dimensions. The noteworthy point of this study is its taking the dimensionality of the scale into account; that is, students' "attitudes toward chemistry as a school subject" was analyzed with respect to two constructs which enables more accurate results about the whole picture.

The findings of the present study cannot be directly compared with the findings of the previous studies since the literature does not provide a study that deals only with the effect of grade level on the enjoyment and importance constructs of attitude toward chemistry as a school subject. However, there are informative studies related to the effect of grade level, gender, and the interaction of grade level and gender (Cheung, 2009) on various constructs of attitude towards chemistry (such as Hofstein, Ben-Zvi & Samuel, 1976; Dhindsa & Chung, 1999). Dhindsa & Chung (1999), for example, reported that females enjoy chemistry laboratory work more than males. Cheung (2009), on the other hand, found that males like chemistry theory lessons more than females in secondary 4 and secondary 5 grades.

According to the findings of the study, the mean scores of Grade 9 students is the highest and Grade 10 students is the lowest. Actually, finding of the highest scores at Grade 9 is in agreement with the findings of the previous studies whereas literature reports a decline across secondary years (such as Barmby et al., 2008). Finding of the lowest mean scores at Grade 10 may be the result of students' extensive exposure to learning in that subject specialist (students select subject specialist at the end of Grade 9 and 10^{th} grade is the first year in the preferred field in Turkish context) and /or the scope of the chemistry contents at 10^{th} grade. Moreover, as students spend time and experience solely the contents of the selected field their attitudes increase again at Grade 11.

Overall, the findings of this study offer that the educational objective of developing positive attitudes toward chemistry lesson is not fully accomplished in Turkey. The highest mean score of students is about 33 (see Table 4) out of 50 in terms of enjoyment of chemistry and about 17 (see Table 4) out of 25 with regard to importance of chemistry dimensions, which can be treated as just above average. To conclude, students of the present study have moderate attitudes toward chemistry as a school subject. This is a causal-comparative study and cross-sectional in nature. A longitudinal research design can be designed in order to evaluate the effect of grade level on attitudes toward chemistry for further research.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 09 ISSN 1309-6249

INVESTIGATION OF PRE-SERVICE CHEMISTRY TEACHERS' CHEMISTRY LABORATORY ANXIETY LEVELS

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ABSTRACT

This study aimed to determine pre-service chemistry teachers' anxiety levels in chemistry laboratory with respect to their grade level and gender and the relationship between pre-service chemistry teachers' laboratory anxiety levels and their achievement in chemistry laboratory. The participants are pre-service chemistry teachers in a public university in Turkey. Chemistry Laboratory Anxiety Scale developed by Bowen (1999) was used to identify their anxiety levels. This scale adapted into Turkish by Azizoglu and Uzuntiryaki (2006) includes four subscales: using equipment and chemicals, working with other students, collecting data, and having adequate time. MANOVA was used to analyze the difference between pre-service chemistry teachers' whole scores of chemistry laboratory anxiety scale and scores of each factor in this scale regarding gender and grade levels. In addition, the correlation coefficient was calculated to find the relationship between their anxiety and achievement levels. The results show that gender and grade level are not effective in laboratory anxiety levels. Furthermore, a significant relationship was found between both anxiety about using equipment and chemicals, and laboratory achievement, and anxiety about having adequate time and laboratory achievement. The study also presents some implications about the role of students' anxiety levels in their achievement in chemistry.

Key Words: Chemistry Laboratory, Anxiety, Pre-service Teachers.

INTRODUCTION

Laboratory activities as students' learning experiences to interact with materials and/or with models in order to observe and understand the connection between science and the natural world are of valuable importance in science and chemical education (Hofstein & Lunetta, 2004; Lunetta, 1998). These activities have a potential to enhance students' conceptual understanding, development of some affective dimensions such as motivation and attitude with respect to science learning, scientific practical skills and problem solving abilities, and understanding of nature of science (Bowen, 1999; Hofstein & Lunetta, 2004). In addition, students have a chance to construct social relationships in a laboratory environment because they work cooperatively in small groups in this environment (Hofstein & Lunetta, 1982; Lazarowitz &Tamir, 1994).

The literature presents some evidence that students' attitudes toward science and their anxiety levels with respect to science courses affect their learning or achievement in science (Atwater, Gardner, & Wiggins, 1995; Koballa & Glynn, 2007; Osborne & Collins, 2000; Simpson & Oliver, 1990). The students with more positive attitude toward science or chemistry are likely to be more successful in science or chemistry lessons (McCarthy & Widanski, 2009). Therefore, in a laboratory environment, students are aimed to be able to not only design experiments and make observations, but also develop more positive attitude and decreased anxiety. Anxiety as one of the affective dimensions of learning has a detrimental effect on students' learning and performance in a laboratory environment as well as classroom environment (Bowen, 1999; Ericson & Gardner, 1992; Keeves &

Morgenstern, 1992). Students' anxiety levels related to chemistry laboratory also has a key role in their attitudes toward chemistry and their achievement in the laboratory. Students might give more importance and are interested in the issues related to safety and risks than chemistry learning in chemistry laboratory (Högström, Ottander, & Benckert, 2010). Furthermore, students need to be given sufficient time and opportunities for interaction and reflection in chemistry laboratory (Gunstone & Champagne, 1990). Using chemical materials and using time effectively to complete an experiment are some issues about which students might have anxiety in chemistry laboratory (Eddy, 2000). Hofstein and Lunetta (2004) argue that teachers' expectations and assessment practices affect students' perceptions of laboratory. An anxious student about chemistry laboratory is likely to have a poor performance in carrying out laboratory activities. That is to say, chemistry laboratory anxiety has a negative effect on students' self efficacy in performance in chemistry laboratory (Kurbanoglu & Akim, 2010). Therefore, determining the extent and the sources of students' chemistry laboratory anxiety will be useful in selecting the way for reducing anxiety levels of the students (Azizoglu & Uzuntiryaki, 2006).

Some research has focused on the relationship between chemistry laboratory anxiety and other variables such as attitude and self efficacy (e.g. Kurbanoglu & Akim, 2010), some focused on just determining the chemistry anxiety levels of the students (e.g. Eddy, 2000), and some investigated the effect of some techniques to reduce students' anxiety levels about chemistry or chemistry laboratory (e.g. Abendroth & Friedman, 1983; Erokten, 2010). For example, Kurbanoglu and Akim (2010) investigated the relationship between university students' laboratory anxiety, chemistry attitudes, and self efficacy beliefs. Chemistry Laboratory Anxiety Scale, the Chemistry Attitudes Scale, and the Self-efficacy Scale were administered to 395 first year undergraduates from four universities. The results show that chemistry laboratory anxiety was correlated negatively to chemistry attitudes and to self-efficacy. Additionally, self-efficacy predicted chemistry laboratory anxiety in a negative way.

Eddy (2000) used Derived Chemistry Anxiety Rating Scale in order to measure college students' anxiety levels related to learning chemistry, being evaluated in chemistry, and handling chemicals. He found that students' mean scores with respect to three subscales of the instrument were significantly different from each other. The order of mean anxiety scale from highest to lowest was chemistry evaluation, handling chemicals, and learning chemistry. Additionally, interview results show that math, answering questions in class, and the lack of relation to life contributed to high anxious students' anxiety about learning chemistry. The researchers also addressed that their handling chemistry anxiety results from Bunsen burner, fire, unstructured labs, acid burns, explosions, and getting chemicals on skin. His study also presents that women had significantly higher anxiety levels than men with respect to chemistry anxiety scale. This finding is also consistent with the Cooper's study. Cooper (1994) also points out that girls have poor performance in chemistry laboratory because of anxious feeling when compared to boys.

McCarthy and Widanski (2009) assessed chemistry anxiety levels of 264 undergraduate students enrolled in introductory psychology, general chemistry, and organic chemistry courses through the use of Derived Chemistry Anxiety Rating Scale with three subscales. They found a significant difference between anxiety levels of males and females with respect to chemistry evaluation. Females were more anxious about chemistry evaluation. In addition, there was a significant mean difference between college majors which are science, allied health, social science, business, education, and tech with respect to learning chemistry anxiety. Another finding was that students who had never taken a chemistry course had higher learning chemistry anxiety levels. They suggest that the first step in reducing students' negative attitudes toward chemistry is determining the existence of chemistry anxiety. Decrease in these negative attitudes would lead to increased student enrollment and achievement in chemistry courses.

Abendroth and Friedman (1983) point out that the college students were especially anxious about grade, mathematical problems, and working in a laboratory. The researchers designed a quasi-experimental study.

The control and experimental group consisted of 17 and 23 students, respectively. In the experimental group, a treatment including recognizing anxiety, talking about them, and experiencing some relaxation techniques was applied in the chemistry lab sessions to reduce students' chemistry anxiety and increase their achievement. The results show that this treatment technique reduced students' chemistry anxiety levels. Another study was designed by Erokten (2010) to examine the effect of chemistry laboratory activities on pre-service science teachers' chemistry laboratory anxiety levels. In order to determine pre-service teachers' anxiety levels, Chemistry Laboratory Anxiety Scale was administered to 100 pre-service teachers as a pre-test at the beginning of the semester and as a post-test at the end of the semester. The results show that pre-service science teachers' chemistry laboratory anxiety levels decreased through the laboratory activities.

The chemistry laboratory learning is one of the important components of chemistry learning. Furthermore, achievement in chemistry laboratory has a key role in self efficacy beliefs regarding chemistry. Therefore, pre-service chemistry teachers' anxiety levels affect their achievement in laboratory as well as students. The research about pre-service teachers' chemistry laboratory anxiety is needed to give insight to chemistry teacher education. Therefore, the present study aims to determine pre-service chemistry teachers' chemistry laboratory anxiety levels.

Research Questions

1. Is there a significant mean difference between male and female pre-service chemistry teachers' levels of whole chemistry laboratory anxiety scale and each factor in this scale?
2. Is there a significant mean difference among pre-service chemistry teachers' levels of whole chemistry laboratory anxiety scale and each factor in this scale with respect to their grade levels?
3. Is there a significant relationship between pre-service chemistry teachers' achievement in chemistry laboratory and their levels of whole chemistry laboratory anxiety scale, and each factor in this scale?

METHODOLOGY

Sample of the Study

The sample of the study was 131 pre-service chemistry teachers (78 females and 53 males) from a public university in Turkey. Pre-service teachers varied from first grade to fifth grade level (25 first graders, 25 second graders, 31 third graders, 28 fourth graders, and 22 fifth graders). The pre-service teachers had different experience in chemistry laboratory in terms of time spending in laboratory. Their achievement was evaluated based on the specific laboratory course that they took in their academic term. For instance, general chemistry laboratory score was considered for first graders, analytical chemistry laboratory score for second graders, organic chemistry laboratory score for third graders, physical chemistry laboratory-I score for fourth graders, and physical chemistry laboratory-II score for fifth graders.

Instrument

In order to measure pre-service teachers' chemistry anxiety levels Chemistry Laboratory Anxiety Scale was used. This instrument was originally developed by Bowen (1999) and adapted into Turkish by Azizoglu and Uzuntiryaki (2006). It consists of 20 items (15 positive and 5 negative items) with a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale is presented in the Appendix A. There are four factors in the adapted version of the scale whereas the original scale consists of five factors. These factors and related item numbers are presented in Table 1.

Table 1: Factors of Chemistry Laboratory Scale

Factors	*Item numbers*
Using equipment and chemicals	1, 2, 6, 11, 16, 17
Working with other students	4, 9, 14, 19
Collecting data	3, 7, 8, 12, 13, 18
Having adequate time	5, 10, 15, 20

The participants completed the questionnaire individually in approximately 20 minutes. The Cronbach-alpha reliability scores are 0.88 for the first factor, 0.87 for the second factor, 0.86 for the third factor, and 0.87 for the fourth factor.

RESULTS

Table 2 and Table 3 present the descriptive statistics of pre-service teachers' whole anxiety levels and each factor level with respect to their gender and grade levels, respectively.

Table 2: Descriptive Statistics of Pre-service Teachers' Anxiety Scores with respect to Gender

Gender	*Anxiety Levels*	*N*	*Min.*	*Max.*	*Mean*	*Standard Deviation*
Female	Whole scale	78	20.0	65.0	46.5	10.4
	Using equipment and chemicals	78	6.00	26.0	14.4	4.51
	Working with other students	78	4.00	16.0	8.41	3.01
	Collecting data	78	6.00	25.0	14.9	4.08
	Having adequate time	78	4.00	15.0	8.82	2.47
Male	Whole scale	53	20.0	95.0	46.2	14.7
	Using equipment and chemicals	53	6.00	30.0	14.8	5.62
	Working with other students	53	4.00	19.0	8.49	3.48
	Collecting data	53	6.00	29.0	13.8	4.90
	Having adequate time	53	4.00	19.0	9.11	3.29

When Table 2 is examined, it is seen that the mean total score of males and females is very similar ($\overline{X}_f$= 46.5; $\overline{X}_m$= 46.2). Additionally, as seen in Table 3, it can be noticed that anxiety level does not change with grade level.

Table 3: Descriptive Statistics of Pre-service Teachers' Anxiety Scores with respect to Grade Level

Grade	*Anxiety Levels*	*N*	*Min.*	*Max.*	*Mean*	*Standard Deviation*
1	Whole scale	25	22.0	63.0	43.8	11.5
	Using equipment and chemicals	25	6.00	24.0	13.5	4.50
	Working with other students	25	4.00	14.0	7.64	2.80
	Collecting data	25	6.00	23.0	14.3	4.38
	Having adequate time	25	4.00	15.0	8.36	2.80
2	Whole scale	25	34.0	79.0	46.3	10.7
	Using equipment and chemicals	25	8.00	25.0	14.3	3.95
	Working with other students	25	4.00	16.0	8.48	2.55
	Collecting data	25	8.00	25.0	14.5	4.16

	Having adequate time	25	5.00	15.0	9.04	2.46
3	Whole scale	31	20.0	72.0	44.3	12.6
	Using equipment and chemicals	31	6.00	21.0	14.3	4.60
	Working with other students	31	4.00	16.0	8.17	2.75
	Collecting data	31	6.00	24.0	13.5	4.38
	Having adequate time	31	4.00	13.0	8.36	2.74
4	Whole scale	28	20.0	72.0	44.3	12.6
	Using equipment and chemicals	28	6.00	21.0	14.3	4.60
	Working with other students	28	4.00	16.0	8.18	2.75
	Collecting data	28	6.00	24.0	13.5	4.38
	Having adequate time	28	4.00	13.0	8.36	2.74
5	Whole scale	22	20.0	64.0	48.0	9.66
	Using equipment and chemicals	22	6.00	28.0	15.0	5.19
	Working with other students	22	4.00	16.0	9.40	3.92
	Collecting data	22	6.00	21.0	14.6	3.84
	Having adequate time	22	4.00	15.0	9.40	2.52

In order to answer our first research question which is related to mean difference between male and female pre-service chemistry teachers' total chemistry laboratory anxiety scores and scores of each factor in chemistry laboratory anxiety scale, MANOVA was used The results show that there was not a significant mean difference for male and female pre-service teachers; Wilks' $\lambda = .950$, F (1,129) = 1.67, $p > 0.05$. These results suggest that pre-service chemistry teachers' anxiety levels are not affected by their gender.

In order to answer our second research question which is related to mean difference among pre-service chemistry teachers' total and sub- chemistry laboratory anxiety scores with respect to their grade levels we conducted another MANOVA. The results point out that there was not a significant effect of grade level on students' whole scores in anxiety scale and each factor scores in the scale (Wilks' $\lambda = .929$, F (4, 126) = 0.571, $p > 0.05$).

In order to answer third research question, we investigated the correlation between pre-service chemistry teachers' achievement in chemistry laboratory and their levels of whole chemistry laboratory anxiety scale, and each factor in this scale. Table 4 shows that there is a negative significant correlation between levels of whole chemistry laboratory anxiety scale and achievement scores, r = -0.198, n= 131, p=0.024. The results also indicate that the correlation between pre-service teachers' laboratory achievement is significantly correlated with their anxiety about having adequate time (r = -0.238, n= 131, p=0.006) and using equipment and chemicals (r = -0.014, n= 131, p=0.024).

Table 4: Correlations between Anxiety Levels and Achievement Scores

	Achievement		
	Pearson Correlation	*Sig.(2 tailed)*	*N*
Laboratory achievement	1	.	131
Whole chemistry laboratory anxiety scale	-,198*	,024	131
Using equipment and chemicals	-,238**	,006	131
Working with other students	-,002	,981	131
Collecting data	-,144	,101	131
Having adequate time	-,215*	,014	131

**.Correlation is significant at the 0.01 level (2-tailed)
*.Correlation is significant at the 0.05 level (2-tailed)

We can conclude that pre-service teachers who had high anxiety about using equipment and chemicals in the laboratory had low achievement in chemistry laboratory. Similarly pre-service teachers, who were anxious about having adequate time, got lower scores in their chemistry laboratory.

DISCUSSION

In this study, pre-service chemistry teachers' chemistry laboratory anxiety levels were examined in terms of gender and grade level. Furthermore, the relationship between pre-service teachers' chemistry laboratory anxiety levels and their achievement in chemistry laboratory was investigated. Although some research findings point out that gender is an important contributor to students' science anxiety in the literature (e.g. Udo, Ramsey, Reynolds-Alpert, & Mallow, 2001), our study documents that gender is not effective in pre-service teachers' chemistry laboratory anxiety levels as consisted with the results of some other research about science anxiety, chemistry anxiety, or laboratory anxiety (e.g. Brownlow, Jacobi, & Rogers, 2000; Davis, 1987; McCarthy & Widanski, 2009). Another finding of this study show that Grade level had not a significant effect on pre-service chemistry teachers' chemistry laboratory anxiety levels. In fact, this result is unexpected because students' experience in laboratory is expected to affect students' anxiety related to laboratory. However, the results indicated that when grade level is increased, students still have similar anxiety levels. A possible explanation for this finding might be the deficiency in teachers' or instructors' consideration of anxious students' in the laboratories. We found a negative relationship between pre-service-teachers' chemistry laboratory anxiety levels and their achievement in chemistry laboratory. There is a widespread consensus in the literature about the relationship between students' anxiety levels and their achievement in science and laboratory courses (Czerniak & Chiarelott, 1985; Zoller & Ben-Chaim, 1988). The results of this study also show that students having high anxiety about "having adequate time" and "using equipment and chemicals" in the laboratory had low achievement in chemistry laboratory.

This study has some implications in chemical education. Students' engagement of appropriate learning strategies in the classroom or laboratory may help them to develop more positive attitude toward lesson and reduce anxiety levels (Feldman, Martinez-Pons, & Shaham,1995; Kurbanoglu & Akim, 2010; VanZile-Tamsen & Boes, 1997). Therefore, instructors should determine anxious students in the laboratory and use effective instructional strategies to reduce anxiety levels of these students. By this way, a more effective learning environment can be created. As Tan (2008) suggested, defining objectives of the tasks, more engagement of exploration, reflection, and argumentation based activities in the laboratory, and designing more purposeful laboratory tasks might be helpful in reducing or controlling students' anxiety levels in the laboratory. Some instructional strategies that promote students to be actively involved in classroom discourse might also effective in overcoming anxious students in chemistry laboratory. In addition, laboratory activities should be consistent with students' intellectual level otherwise this might increase students' anxiety levels. Furthermore, teachers' attitudes toward students in science lessons and laboratory sessions might lead to increase the number of anxious students (Udo et al., 2001). In conclusion, for a more effective learning environment in chemistry laboratory, anxious students should be determined and instruction in the laboratory should be designed by considering these students. Additionally, while preparing laboratory activities, the ways of reducing students' anxiety levels should be taken into consideration. For further research, the relationship between chemistry laboratory anxiety levels and other variables such as attitude and self-efficacy can be investigated in different contexts. Furthermore, qualitatively designed research focusing on the reasons of students' laboratory anxiety might give more detailed information about chemistry laboratory anxiety.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 10 ISSN 1309-6249

SOME FEATURES OF THE INTERACTIVE WHITEBOARDS FOR GEOGRAPHY TEACHING IN SLOVENIA

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ABSTRACT

Education information society in the 21st century requires new teaching approaches which will effectively promote the development of learning skills. The ability to find, analyse, critically evaluate and rationally use different information's is one of the key pillars of learning competences for the future. If we want to make a difference in the educational system, which will be followed by the up to date society, we must also enforce and modify forms and methods of teaching work, teaching aids (ICT) as well as teachers' training courses. In the article we present some features of interactive whiteboards in geography lessons as it represents a relatively new technology in Slovenian schools. ICT education equipment in schools will be presented as well as opinions of Slovenian geography teachers about their strengths and weaknesses as well as problems which they face in teaching geography. Their diverse personal experiences are an important guideline in designing future geography teachers training courses.

Key Words: interactive whiteboards, teachers, geography.

INTRODUCTION

Various documents (The Lisbon Strategy, 2000; Key Competences for Lifelong Learning – An European Reference Framework 2006, White Paper on Education in RS 2011), supporting the introduction of modern information and communication technology (ICT) in education, setting in front of the Slovenian teachers the mission to develop students' skills in digital literacy so how they are able to follow the needs of modern society, based on rapid access to some new information and their movement and the use of the ICT in everyday life. Also, it is important to think about ICT in the professional life of every individual.

The use of ICT has increased significantly in European schools during the period 2005 till 2009 as evidenced by the survey (Benchmarking Access and Use of ICT in European Schools, 2006) on the use of ICT in primary and secondary schools. 96% of all schools in the EU25 have an internet access, of two-thirds (67%) of schools have accesses to a broadband Internet. Results for individual countries are quite different. 90% of schools in the Nordic countries, Estonia, Malta and the Netherlands have a broadband internet, this is among such schools in Greece, Poland, Cyprus and Lithuania is much less (35%). In Slovenia, they have an internet access in all primary and secondary schools. 85% of Slovenian schools have a broadband internet (Gerlič , 2010).

ICT IN EDUCATION

Reports from Europe's digital Competitiveness (2009) show how all EU Member States are aware how information and communication technology (ICT) are increasingly necessary to be introduced in the educational process and the Information Society to train 21st century learners. ICT changes the education system and enables or requires the development of some new teaching approaches. Therefore it is called a »transformational ICT«. (Bučar, 2011, note quoting Gavin, 2005) Technology can be used in a very different field of education; teachers and students use it in lessons, technical staff with the administrative work, director

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July 2012 Volume: 3 Issue: 3 Article: 10 ISSN 1309-6249

of the organization of schools, etc. In line with the European policy, Slovenia has adopted in 2007 » SI2010 Strategy for development of information society« and in this paper has undertaken to strengthen research and development in ICT(Brečko & Vehovar, 2008).

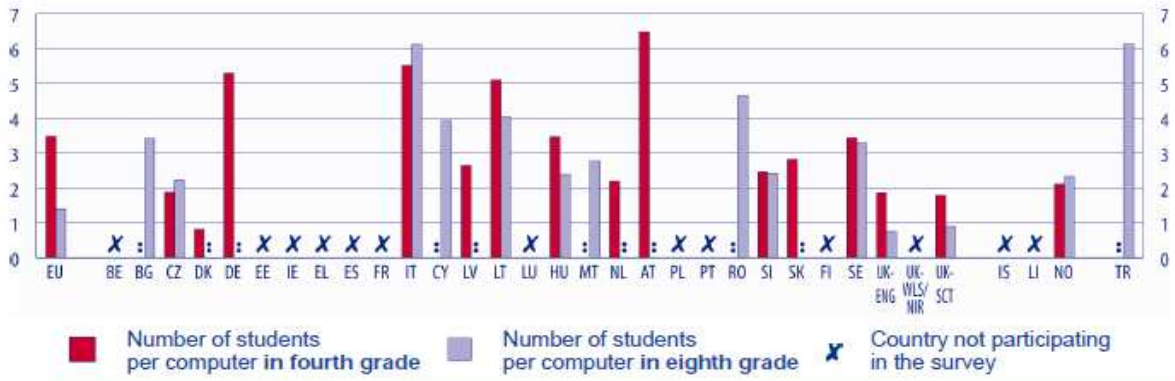
THE PREVALENCE OF THE USE OF INTERACTIVE WHITEBOARDS IN THE CLASSROOM

From international research (Key data…2004 and 2011, SITES 2006) we can conclude how all the schools in European countries has been very differently equipped. A decade ago, in the survey Information and Communication Technology in European Educations Systems (2001) observed how in this period, European countries can be classified into: a group of countries where schools are well equipped with some basic computer technology, a group of countries which aim is to develop school web network. Third groups, as are those countries where the lack of schools equipped with the most basic ICT. According to all available data from the Slovenian research (Gerlič 2005, Gerlič 2010a , Gerlič 2010b) suggests that Slovenia could in the time of the study (2001), ranked second in the group. Today, ten years later, we have observed some significant progress. Ten years ago, schools in Slovenia struggled with the installation of basic hardware and software, today as in other developed European countries the basic ICT installed. Now the emphasis is on equipping schools with broadband Internet and other online technologies such as I-boards (Bambič, 2009).

In an international study Key data on Information and Communication technology in Schools in Europe (Key Data…, 2004) found how most European countries does not provide for the relationship between the number of pupils and the number of computers. The exceptions were the United Kingdom, Malta and Slovenia, where they made recommendation that the optimal ratio of 1:7. The recommendation of the Slovenian Ministry is 1 in 5, which means at least one computer in each classroom (Bambič, 2009).

In 2010, repeated surveys (Bambič, 2009) found a significant increase in the number of computers in schools, according to the year 2000. At least half the students attend school in the EU, in which is at least one computer per two students. Also differences between countries in ICT are now much lower than ten years ago. On average, the best equipped schools are in the UK, where the number of computers in schools is higher than the number of students. In 2007, in most of the European counties was one single computer for 2 or 4 pupils, in Slovenia there is on average one computer per 3, 37 children (Key Data…, 2011).

Table 1: The average number of students in the 4th and 8th class on one computer. Report to school principals in the EU 2007th



	EU	BG	CZ	DK	DE	IT	CY	LV	LT	HU	MT	NL	AT	RO	SI	SK	SE	UK-ENG	UK-SCT	NO	TR
■	3.5	:	1.9	0.8	5.3	5.5	:	2.6	5.1	3.5	:	2.2	6.5	:	2.5	2.8	3.4	1.9	1.8	2.1	:
■	1.4	3.4	2.2	:	:	6.1	3.9	:	4.0	2.4	2.8	:	:	4.7	2.4	:	3.3	0.7	0.9	2.3	6.1

Source: IEA, TIMSS 2007 database.

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According to the Slovenian research (Gerlič, 2010b) is in Slovenian primary schools more stationary computers (82, 2%) than laptops (15, 8%). Most computers have an older processor and accessories (47, 7%), only 11, 2% of computers have newer processors with some optional equipment. On average, the Slovenian primary schools have one computer to 8,4 students which is also good on a European scale. In the same research (Gerlič, 2010b) found out how in 2009, almost 16, 8% of Slovenian primary schools have whiteboards. Their acquisition is planned with 70, 6% of surveyed_schools. But only 7, 8% of surveyed primary schools have interactive plates, 2, 5% of them have responders and 10,7% of them are planned to purchase this equipment. It can be said how Slovenian schools are well equipped with ICT, while satisfaction is slightly modified when we questioning the frequency of its use in the classroom. Reports from a national survey of ICT in 2010 (Činkole and Brečko, 2010) shows that the respondent Slovenian teachers in December 2009 using most often during the lesson a computer (26% each school day) and projector (22% of each school day). At least frequent they used the online classroom and the I-board (43% of teachers was never used it, 8% occasionally, 13% a few times a month). The integration of an i-whiteboard is mostly common between the 14 year olds surveyed (36% of each school day, nearly 9% of each school day), 91% of surveyed students report how their teachers never used an i-whiteboard.

Table 2: Review of frequency of use of the ICT by individual teachers in the Slovenia in 2009, according to the age of pupils.

Incidence of use whiteboard during lessons in primary schools		**Pupils age**												**Total**	
		10		11		12		13		14		15			
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
	every day	0	0,0	5	25,0	0	0,0	5	21,7	8	36,4	0	0,0	19	19,7
	nearly every day	0	0,0	0	0,0	0	0,0	0	0,0	2	9,1	0	0,0	2	2,1
	several times a week	2	33,3	3	15,0	0	0,0	3	13,0	5	22,7	1	9,1	14	14,7
	several times a month	0	0,0	3	15,0	2	14,3	7	30,4	0	0,0	0	0,0	13	13,1
	occasionally	2	33,3	0	0,0	4	28,6	2	8,7	0	0,0	0	0,0	8	8,2
	never	2	33,3	9	45,0	8	57,1	6	26,1	7	31,8	10	90,1	41	42,2

Source: Činkole & Brečko, 2010

Interviewed teachers, as the most common cause pointed out how they rarely use the i-whiteboards, indicate the reason that they do not have them in their classroom and have to move students into a classroom where the whiteboard is situated. Slovenian teachers frequently use i-whiteboard in the stages of consolidation, acquisition of new material and the stage of examination. Most teachers' use, when working with i-whiteboard, material accessible from the internet and purchased already prepared material (Bačnik, 2011).

There is a relatively large gap between the equipping of schools and the use of modern teaching aids such as i-whiteboards; they also note the survey equipment at schools and the use of interactive whiteboards. Of a total of 325 teachers being taken in a survey the 237 (72, 9%) of them responded that they do have i-whiteboard on the school and almost 85 (35, 9%) of them said that they have two whiteboards in their school. The most common in Slovenian schools are Prometheans interactive whiteboards, followed by the Interwrite, Smart and

Hitachi. Schools were able to obtain the whiteboards through some national calls for the equipment being given by the Ministry of Education and Sport, and less money they invested to purchase those by themselves or with some donators help. The maximum number of i-whiteboards is situated on the upper level, in the classrooms for Math, Chemistry and English. (Bačnik, 2011)

SURVEY: TEACHERS' PERCEPTION OF GEOGRAPHY ON THE PROS AND CONS OF USING THE INTERACTIVE WHITEBOARDS IN GEOGRAPHY LESSONS

Department of Geography in Faculty of the Arts (University of Maribor, Slovenia) in the framework of practical professional training of students-future teachers of geography is deeply involved with a number of elementary and secondary teachers of geography. For efficient implementation of pedagogical practices are certainly crucial school teachers trained as mentors and proper working conditions (learning equipment), while bearing in mind the possibility of using the ICT in geography lessons. In the academic year 2010/2012 there were 27 elementary and 19 secondary school teachers, mentors to geography students in their teaching practice. In students reports we found out that in the mentoring schools in that year had whiteboard on 21 (77.7%) primary schools and on 13 (68.4) secondary schools, of which they have installed i-whiteboard in 15 geographical classrooms in primary schools and 10 geographical classrooms in secondary schools. In the 14 days of mentoring students on teaching practice, the whiteboard was used by 5 teachers (18.5%) at primary level and 4 teachers (21.1%) in secondary schools.

OBJECTIVES, METHODOLOGY AND RESEARCH SAMPLE

From the data collected within the teaching practice of students of geography, as is described in the previous national surveys, demonstrate how the Slovenian primary and secondary schools are relatively well equipped with i-whiteboards and similar to this counts also for all Slovenian teachers and also teaching a geography it can be determinate the gap between the availability and frequency using i-whiteboards in the classroom.
To better understand the reasons for this situation, we invited six teachers of geography who were mentors to students in teaching practice and are used in geography lessons i-whiteboard, in the month of June 2011, to explain us their opinion about the advantages and disadvantages of the use of i-whiteboard in geography lessons and importance of including it in the teaching of geography.

A smaller pilot study was based on the descriptive method of empirical educational research.

In participating teachers of geography had on average 8.4 years of work experience and have been using i-whiteboard from one to three years. Everybody had a university degree, basic knowledge of the use of i-whiteboard being gained in the seminars organized by the school (four interviewed teachers) or attended by an individual (two interviewed teachers). Four of them were employed in primary schools (three women and one man), and two in high school (one female and one male). The interviewed geography teachers taught in schools, which are located in North Eastern Slovenia, three of them are located in cities (two secondary schools and one elementary school), three elementary schools are located in rural areas.

Data collection was based on individual unstructured interviews, which on average lasted 20 minutes. The data were analyzed at the level of description. We have created some opinions of the interviewed geography teachers in two parts, where we have tried to point out the most frequent responses of some individuals as illustrations of written responses and its generalizations.

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RESULTS AND INTERPRETATION

The importance of interactive whiteboard integration in geography lessons

In describing the reasons for the application of i-whiteboard in geography class the interviewers' highlighted two reasons. The first was linked to the development of digital capabilities of student as competencies relevant to the life and work, and the other one was on many multimedia capabilities i-whiteboards can support in terms of geography learning clearness.

Examples of responses:

I think e-learning examples are and will help to traditional teaching in the future, so I see no reason why it would not start now. Sooner or later, the notebooks, textbooks and workbooks, will be replaced by the student portable computers. I-whiteboard is one of the tools I use in teaching. Even in geography lessons, pupils get digital literal so it is right to enable them to use it. I love the technical innovations; I- whiteboard really is a challenge to bring together the teaching of geography and modern technology.

There is no better example to represent as the process of teaching geography through the i-whiteboard as created. It allows a lot of learning clearness: the picture and sound to the graphic illustration. Here is everything included.

Advantages and disadvantages using interactive whiteboards at geography lessons

When using i-whiteboards at the geography lessons the interviewers observed that in their work both advantages and disadvantages were noticed. Here are some features as: quick access to various media, occasionally showing as a preference (for easy manipulation, economical use of time), on the other side as a weakness (too fast workflow, which some students cannot keep up). The most common benefits of using they stated: increased students' motivation, varied clearness of teaching material, the variety of lessons, better educational records, updating teaching materials, the Web, working with maps, use of audio and video clips.

Examples of responses:

I can see my students being more active, they follow lessons more, ask more questions, using maps, working with silent maps, spatial performances by all that now attracts more than if they use atlases. The biggest advantage is the quick jump to multimedia material, which we use it more often and we use the wide range of diversity of multimedia material than before.

As disadvantages of using i-whiteboard it was noted: technical shortcomings (poor image, install signs demanding that everyone can see it or reach, size of signs in the concealment of large class-vision), the price of i-whiteboards and additional connections, price maintenance, along with an i-whiteboard works only one student, you must be very careful where something is, the great time spent on producing teaching bases, costly ongoing additional training.

Among the less desirable consequences of the use of whiteboard are also described:

Most students are digital faster and finds himself quicker on the big board as myself and I feel so uncomfortable.

The more hours of artificial light and strong bulbs often hurts my head. It happened that I spent a whole afternoon to prepare two lessons then in the school electricity went off.

The interviewed teachers are satisfied teaching with i-whiteboards. Reviews are showing how they are not left behind the other school subjects in terms of using the ICT especially i-whiteboards in the classroom. They do point out, how they would like to have as many examples of good practices such as cooperative learning,

passing from one teacher to another and caring and helping to overcome the beginners uncertainty. They highlighted also many positive motivational students' reactions to practice through i-whiteboards and the possibility the students have now to experience the use of the ICT during their study, while being the students themselves they did not have the mentioned options for their education.

Opinions interviewed teachers of geography about using i-whiteboard are thus in good agreement with the opinion of their English colleagues: "Teachers report that increased student engagement is the number one benefit to teaching with this tool. The technology allows teachers to integrate multiple information streams into a coherent lesson individualized for their students. Interactive white boards provide an extraordinary opportunity to create classroom environments where students with different learning styles can engage and learn from each other. This easy-to-learn technology ensures that both students and teachers are developing 21st century skills"(Teich, 2009).

SUMMARY

Effective teaching with i-whiteboard requires skilled and motivated teachers. Especially should be aware of teaching values with i-whiteboard and its impact on education. Slovenian teachers in recent years have had the opportunity to visit the many seminars that provide training for the use of an ICT including whiteboard. The disadvantage of these seminars is the fact that there is not enough emphasis on new methods and forms of teaching. Although the Slovenian geography teachers are increasingly choosing to use ICT equipment that they have at school, they still do not feel sufficiently qualified for teaching in significant changes in the selection of teaching methods and forms of work. The most important didactic information which i-whiteboard should carry is the interactivity that makes the modern ways of communication and active forms and methods of teaching geography, which undoubtedly changes the role of the teacher from someone who relays information to the organizer of instruction. Is perhaps this "leap in teaching philosophy" is the biggest barrier to more frequent and effective use of i-whiteboards in geography lessons in Slovenia?

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 11 ISSN 1309-6249

USE OF DIGITAL VIDEO RECORDING IN THE PREPARATION STAGE OF PRE-SERVICE FOREIGN LANGUAGE TEACHERS' MICRO-TEACHINGS

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ABSTRACT

The paper reports the findings of a study done to investigate the perceptions of 64 pre-service foreign language teachers on their experiences with digital video recording during the preparation of their micro-teachings to practice teaching English as a Foreign Language (EFL). For two semesters and in two EFL Methodology courses participants worked in small groups to prepare their lesson plans and in-class micro-teachings and their group discussions were self-recorded. Main data collection instrument of the study was a survey which included multiple choice/short answer questions to gather demographic data and open-ended questions on participants' perceptions about video-recordings. Data were analyzed both quantitative and qualitative means. Findings of the study illustrate that the use of digital video-recording in the preparation stage of micro-teachings may have both advantages and challenges, which are discussed in the paper in relation to the author's suggestions for pre-service teacher education and the use of digital videos.

Key Words: Digital videos, foreign language teacher education, pre-service teachers.

INTRODUCTION

Easy access to relatively affordable video recorders as well as in-built cameras in laptops and cell phones has made digital video capturing and viewing very popular in our lives. Particularly, the use of smart phones made it possible to record digital videos, edit and upload them to the Internet as well as to share videos with numerous online communities via online tools such as Facebook, Youtube, and Blogs. In addition to the everyday use of digital videos, teaching and learning with the help of digital videos have been very common in education for the last couple of decades. Even though the use of video has always been present in education, the introduction of digital video parallel to video capturing and editing software in personal computers has led to an increase in individual use on self-recorded videos by both teachers and learners.

In addition, use of digital video can potentially be a powerful and effective technique in teacher education programs. Research done on the use of video to promote teacher reflection and awareness has generally shown that teachers benefit from using, recording, and viewing videos in several ways. For example pre-service or in-service teachers can watch good examples of teaching in their fields, they can watch peers' teaching, or they can watch their own teaching performances. In technique, teachers -whether pre-service or in-service- can analyze videos, reflect on the content, and/or give comments. This process is believed to increase the level of awareness about teaching and learners in general (Dymond & Bentz, 2006; Hernandez-Ramos, 2007; Kong, Shroff, & Hung, 2009; Liu, 2012; Tripp & Rich, 2011). In addition to promoting awareness and reflection among teachers in teacher education programs, using videos have several other advantages. Videos are advantageous because videos provide teacher educators and teacher trainees with an opportunity to see the link between theory and practice (Dymond & Bentz, 2006) , a record of teaching practice for future use (Wu & Kao, 2008), and analyze the teaching/learning processes in slow motion by allowing to "replay, freeze, or view actions frame by frame" (Hung et al, 2004). Videos also serve as a "mirror" to one's own or other's teaching as they present an authentic representation of real world account of what happens in the classroom (Dymond & Bentz,

2006). So, Pow, and Hung (2009) claim that student teachers "may have a mental model for a planned teaching experience and have another mental model of what actually happens" (p. 776). Videos can help teachers to close the gap between two mental models as videos may provide an objective view of what happens in the real classroom. Clarke (2009), who asked learners to state "the plus, minus and interesting features of the use of cameras as a viewer" (p. 960), reported that learners found "video clips as more 'honest' conveying emotions and complexity in a way that it is not possible with text"(p. 960).

Use of video may have further benefits and advantages for English as a Foreign Language (EFL) pre-service teacher's education because with the help of videos EFL teacher trainees can watch native speakers, native EFL teachers, improve their speaking skills in English with self-monitor, and observe non-verbal language (Clarke, 2009) which is an integral part of communication. Using videos to teach English is a regular technique in EFL classrooms. However, how to create, edit, and present a video in EFL classrooms has been the focus of EFL teacher education programs only for the last couple of years. Hernandez-Ramos (2007) states that "the need to develop a critical ability when looking at video, and to use this ability as a reflection and learning tools about one's own practice, can only be developed with explicit practice" (p. 38). In other words, EFL teachers, like any other teacher in any field, need to experience the use of video for reflection on their own teaching and for their learners' learning in their undergraduate education, which calls for an understanding of the advantages and challenges through experiencing the use of digital videos as learners themselves first.

On the other hand, despite this need and the popularity of videos in EFL classrooms, the studies done on the use of digital video by EFL pre-service teachers are limited in number. Moreover, research on how FLE pre-service teachers use digital videos out of the classroom in the preparation stage for teaching practice is almost non-existent. Thus, there was a need to explore the EFL pre-service teachers' opinions about the use of videos for the preparation of teaching in English Language Teaching (ELT) Methodology courses in the undergraduate programs. The study reported here was designed to take a step to meet this need. The main goal of the study was to investigate the advantages and challenges the use of digital videos recorded during study group activities of EFL pre-service teachers outside the classroom. Main research question asked in this study was:

1) What are EFL prospective teachers' perceptions on the use of digital video recording of their group work activities in the preparation stage for ELT Methodology micro-teachings?

a) Based on the perceptions of EFL pre-service teachers, what are the advantages of using digital videos in the preparation stage of micro-teachings

b) Based on the perceptions of EFL pre-service teachers, what are the challenges of using digital videos in the preparation stage of micro-teachings

With the help of the data gathered via this study, the educator-researcher hoped to analyze the advantages and challenges of digital videos in EFL teacher education courses with input, comment, and feedback from EFL pre-service teachers. Rest of the paper gives more specific information about the method used in the study, findings of the study, and discussion of the findings.

METHOD

In this section demographic data about the participants, the context in which the study was conducted, and the data collection procedures are presented in addition to the data collection instruments and data analysis methods.

Participants

Participants of the study were 64 prospective EFL teachers who were in their third year of a four year B.A. program in Foreign Language Education at a state university in Turkey. Eight of the participants were male and the rest, 56, were female. The average age of the participants was 21. Participants were given a consent form at the beginning of the survey and they had the right to or not to participate in the survey. Each participant was

given a number in the data collection and data analysis process to keep the identity of the participants confidential and to preserve the rights of the participants. List containing the names of the participants and their assigned number was accessible only by the researcher.

Data collected in Part A of the survey revealed that out of 64 participants 38 perceived themselves as "Intermediate" computer user whereas the rest, 26, perceived themselves as "Advanced" level computer user. None of the participants viewed themselves as "Novice" computer user, which indicated that they had basic computer skills. In terms of video-recording skills, three participants stated that they were "Novice", 45 identified themselves as at "Intermediate" level, and 16 participants viewed themselves having "Advanced" skills in video-recording. Another finding that was revealed in Part A was that all participants, except one, used personal laptops. Thus, participants were not short of technological resources to view their preparation videos (prep-videos). In order to record their prep-videos, more than half of the participants (35) participants used digital camera, 22 used cell phone camera, and seven used in-built laptop camera. Overall participants had the necessary technical skills and technological devices to record and view their prep-videos.

Data Collection Procedure and Instrument

The data collection procedure lasted for two academic semesters. In each semester participants attended ELT Methodology courses and in these courses participants were expected to prepare EFL lesson plans and take part in micro-teachings in the classrooms. Participants prepared their lesson plans in pairs or groups of three; however, pair or group members took turns to act as teachers in the micro-teachings in class. Before micro-teachings, participants were asked to video record their pair/group work and hand the recording in to the educator-researcher on a DVD on the day of the micro-teaching. Participants were asked to video record five to ten minutes of their group work activity to avoid excessive file size and recording/storage problems. Participants were advised to record the important stages of their preparation showing the main decisions they took regarding their lesson plans and micro-teachings. Participants were expected to use English at all times as they were being trained to be future EFL teachers in a university whose medium of instruction is English. All the prep-videos were watched within two weeks after the initial submission of the files and participants were given general oral feedback on the appropriateness of the videos for course purposes by the educator-researcher. At the end of the two semester period, each pair/group submitted five video recordings in five different lesson plans and micro-teaching topics.

At the end of semester two, in order to answer the research questions of the study participants were given a survey. The survey was designed in English and participants wrote their answers in English. This survey was mainly divided into two: Part A: Multiple choice/short answer questions to gather demographic data about the participants, data on participants' perceived computers skills, and types of technological tools that they used for prep-videos and Part B: Open-ended questions to gather data on the perceptions of the participants' about the advantages and challenges of prep-videos. Two open-ended questions that were asked to participants in Part B were:

1. *In your opinion, what are the advantages of recording your preparation sessions before the micro-teachings? Please, support your answer by giving specific examples.*
2. *In your opinion, what are the challenges of recording your preparation sessions before the micro-teachings? Please, support your answer by giving specific examples.*

Data Analysis

The data gathered in Part A of the survey were analyzed through frequency analysis. The participants' answers to open-ended questions in Part B were analyzed through 'Constant Comparison Method' (Maykut & Morehouse, 1994). All the responses of the participants Part B of the survey were read and analyzed line by line and patterns emerged from the data were analyzed through 'open, axial, and selective coding' (Strauss & Corbin, 1990). First, in open coding the data were coded to identify each category of meaning emerged from the participants' responses to open-ended questions. As a result of open coding, common themes that

emerged from the data were listed. In axial coding, open coding themes were analyzed and grouped under similar categories. Finally, most common themes were chosen in selective coding to the point of 'theoretical saturation' (Glaser & Strauss, 1967; Hatch, 2002); that is, until no further relevant data regarding categories emerged.

FINDINGS

Responses of the participants to the open-ended questions asked in the survey revealed several advantages and challenges of using videos in EFL pre-service teachers' preparation for their micro-teaching activities. These advantages and challenges will be presented in relation to participants' perceptions and excerpts from their responses to the questions in the following sections.

Participants' Perceptions about the Advantages of Prep-videos

Participants stated several advantages of prep-videos in the survey. Table 1 below shows the top five commonly stated advantages of prep-videos stated by the participants in their answers to Question 1 in Part B. Table 1 also presents the frequency of each advantage calculated at the end of the coding process in qualitative data analysis.

Table 1: Top Five Most Frequently Stated Advantages of Prep-videos

Order	Advantages of Prep-videos	Frequency (*f*)
1st	Allowing self-evaluation and correcting mistakes	19
2nd	Increasing self-confidence by being more prepared for micro-teachings	18
3rd	Improving speaking skills in English	17
4th	Helping to analyze the lesson plans in a better way	16
5th	Increasing collaboration with peers and ensuring fair distribution of work load	13

As it can be seen in Table 1, the first advantage stated by the participants was related to self-evaluation. Recording and watching their prep-videos encouraged participants to evaluate their work objectively. With the help of prep-videos, 19 out of 64 EFL teacher trainees stated that they could see the weak points in their lesson plans because they had to talk about the process they went through. For example, one participant wrote:

"While you are preparing your lesson plan you may not see the faults of the lesson plan but if you vocalize it in some ways like recording, you can see the mistakes and correct them." (Participant 17)

Another participant stated that prep-videos encouraged them to talk about the lesson plan, which helped them to be more prepared for the micro-teachings:
"When we record our preparation sessions, we talk about our lesson plans and what we will do. It makes my micro-teachings easier. I remember what I will say exactly. Sometimes I realize some errors in our lesson plans while recording videos, then I correct them. It is useful in this aspect." (Participant 35)
Second advantage of prep-videos was increasing self confidence among teacher trainees. Eighteen participants wrote about this advantage. One participant said "I know what I am going to do in detail and I feel confident" (Participant 20) and another one stated "I feel more professional while I am recording my lesson plan" (Participant 29). Some participants felt that going through the prep-video process was similar to rehearsing the micro-teachings. For example:
"It helps us to revise what we did and speak about it so I can say recordings were some kind of mini micro-teachings" (Participant 42).

"This enables us to see what we have done for the micro-teachings better by revising it one more time and video-recording helps us too feel more confident in micro-teachings by improving the ideas related to the lesson plan and by developing our speaking." (Participant 11).

"It helps me to revise what we did in our lesson plan and why we put some activities in it. It also helps us as a group to work collaboratively while we are telling what we have integrated to our lesson to be given (Participant 63).

Thanks to the prep-video activity, participants felt more relaxed and comfortable in the actual micro-teaching as they had rehearsed what they would say and do in class. They also had the chance to reflect back on their activities, which made them more aware of the decisions they made as a group and the rationale behind these decisions. Another advantage of prep-videos was improving speaking skills. Participants found prep-videos helpful especially for improving their pronunciation in English. One participant stated that with the help of the prep-video she had a chance to listen to her own speaking English (Participant 61). Another participant talked about this advantage by saying that:
"Good for our pronunciation skills. For example, when I am speaking I can't realize how I spell a specific word, but when I record my voice I find my mistakes (grammatical, pronunciation) and correct it before micro-teaching"(Participant 30).

The fourth top advantage that participants wrote about in relation to prep-videos was on organizing the lesson plans in a more detailed and better way. Participants (*f*=16) stated that prep-videos were helpful in going over the lesson plan before the actual micro-teaching so that they could see whether the stages, tasks, and activities were linked meaningfully. For example, Participant 1 said:

"It helps us to see the lack of smooth organization of the lesson plan. When we see that we don't turn back to the lesson plan but we are careful about the transition between the stages when we are doing our micro-teachings" (Participant 32).

Another important advantage of recording prep-videos was related to collaboration and fair distribution of workload among group members. Prep-videos made sure that group members came together as the videos would be watched by the instructor. In this way, prep-videos served as a control mechanism in the group work activity, which led to more opportunities for group members to share ideas and opinions.

"If there is no recording sometimes just one member of the groups does everything, but if there is recording everybody has to be there" (Participant 22).

"It provided us to take an equal role in preparing the lesson plan" (Participant 36).

"By means of that (*prep-videos*), group members get together and share their opinions" (Participant 47).

As participant 47 stated without prep-videos, it was not possible for the instructor to know for sure if everyone attended the group meetings, contributed to the preparation of the lesson plan, and supported their group members for the success of micro-teachings. With the help of prep-videos, even teacher trainees who were reluctant in coming to group meetings and/or collaborate with peers had to be present in the preparation stage of the micro-teachings. Another participant also mentioned that prep-videos were useful in increasing the level of collaboration and interaction among group members:

"The video recording task is very useful for the students. Video recording increases collaboration, interaction among group members. They can be aware of what they are doing and revise their work" (Participant 57).

In addition to the top advantages of the prep-videos listed in Table 1, some participants also stated that they enjoyed and had fun in prep-video activity:

"It was enjoyable. We gather and prepare ourselves. I mean not only we prepare our speech, we also prepare ourselves, our clothes, hair. It was funny" (Participant 55).

Thus, being in a group work activity for the prep-videos might have also had a motivating effect among some of the teacher trainees. In summary, EFL pre-service teachers in this study believed that prep-videos were useful because they helped teacher trainees to see/correct their own mistakes, increase their self-confidence, improve their speaking skills in English, analyze their lesson plans in more detail, and increase the amount of collaboration and fair distribution of workload within their study groups.

Participants' Perceptions about the Challenges of Prep-videos

A number of participants (*f*=21) wrote that prep-videos were not challenging whereas some other participants mentioned several challenges of prep-videos. Top five frequently given answers to Question 2 in Part B by the participants are listed in Table 2 below:

Table 2: Top Five Most Frequently Given Participant Responses about the Challenges of Prep-videos

Order	Participants' Answers	Frequency (*f*)
1st	None/No challenge	21
2nd	Recording prep-videos was time-consuming	14
3rd	Not useful if prep-videos were recorded after the preparation is over	13
4th	Video-recording made me nervous	9
5th	Speaking in English in prep-videos was difficult	3

Almost one third of the participants (*f*=21) said that prep-videos did not have any challenges. Among the participants who pointed out some challenges, the most frequently stated challenge of prep-videos was time-constraints (*f*=14). Participants stated that designing the lesson plan, preparing the micro-teaching activities, and recording the prep-videos took a lot of time.

"It requires time to record. It may seem just 5 minutes, but sometimes we have to record the video more than two times. Since we can make some mistakes and laugh to some situations we have to record the video again and again" (Participant 32).

In addition, participants stated that it was sometimes difficult to find a day and time suitable for all group members to come together and record the videos. Another challenge that was mentioned by some of the participants (*f*=13) was related to the ineffectiveness of the prep-videos. This challenge resulted from group members' not following the proper process of group work and prep-video activities. Instead of recording the videos as they prepared the lesson plan, some participants chose to record the video after all the work was done.

"As to be honest, we recorded the videos after we finished the lesson plan, but we pretended we have just started the lesson plan. Because we don't have enough information or expectations without dealing with the lesson plan" (Participant 49).

"It is not so easy to record our process of preparing the lesson plan. Since when we start preparing it, it is easier to continue till we finish without giving any break. So we prepared the video after we finished preparing the lesson plan" (Participant 56).

Participants' comments above show that some teacher trainees failed to notice or chose to ignore one important function of the prep-videos which was having a record of the preparation process as they go along. Instead, some teacher trainees recorded the prep-video after they finished all the work related to the lesson plan because they wanted to focus on the lesson plan first. Most participants who did not benefit from the prep-videos were the ones who did not follow the instructions to the prep-video activity. When they recorded after all the work was done, video recording seemed as an unnecessary activity. Teacher trainees who recorded prep-videos after the preparation was finished were unable to see the value of prep-videos in contrast to the teacher trainees who followed the instructions of the activity by recording they progress as they went along. Being unable to see the benefit of prep-videos may also be the result of participants' focusing too much on what and how they are going to say in the prep-videos. In fact, about another frequently stated challenge (*f*=9) participants wrote that they were nervous and they rehearsed or wrote down what they would say in the recordings, which made the activity unnatural to them:

"Even though it is useful sometimes it is like a burden. I feel anxious. Therefore, I generally memorized what to talk before readings. It was unnatural" (Participant 16).

"It makes me nervous sometimes. I can't say anything or I don't know what to do. I hear my pronunciation, try to correct it and it takes time" (Participant 25).

The last commonly mentioned challenge participants stated was on the use of English, their foreign language, rather than Turkish, their native language.

"Generally we talk in Turkish during preparation, but we are supposed to speak in English in the recordings. Thus we focus on language so much that sometimes we may lose our concentration on our lesson plan" (Participant 13).

"It doesn't sound natural because we are under a kind of stress and talking in English doesn't allow us to behave naturally" (Participant 19)İ

"I saw that I am a bit shy while talking to camera and while speaking in English, I am not efficient enough and I am not comfortable. I understood these by means of video-recordings because it became a mirror which shows my faults, so thanks for this activity (Participant 10).

However, only three participants wrote about this as a challenge. In general, participants did not have a problem with speaking in English as they were advanced speakers of English.

While I am watching my video, I see my pronunciation and I also notice how I enjoy speaking in English" (Participant 18).

Even though the benefits of the prep-videos outweighed their challenges according to the overall analysis done on the perceptions of participants, some difficulties in prep-video activity as presented above were pointed out by the participants. In summary, we can list these challenges as time constraints, unnaturalness of prep-videos if they are recorded after the work is done, causing nervousness as a result of participants' excessive self-monitoring of speech, and the difficulty of using English as a second language.

DISCUSSION AND CONCLUSION

Overview and Discussion of Findings

The findings of the study demonstrated that using prep-videos in EFL pre-service teacher education may have both benefits and challenges. The responses of the participants in the study revealed that that the benefits of

the use of prep-videos were relatively more than its challenges. One of the most important benefit and advantage observed by the participants was in relation to self-evaluation and correction. Teacher trainees appreciated the chance to view their lesson plans in an objective way with the help of the videos and having the opportunity to make necessary corrections before the actual micro-teaching. This finding is similar to one of the conclusions Tripp and Rich (2011) made after reviewing "63 studies where participants recorded their own teaching, examined their performance on video and reflected on their performances" (p. 1). Tripp and Rich (2011) stated that "novice teachers reported it was helpful to see other teachers at their same level because they were able to observe their peers' mistakes they would make themselves but failed to recognize previously" (p. 6). Thus, working in groups with peers, discussing the lesson plans and decisions they made to design these lesson plans might have helped teacher trainees to evaluate their work in a better way.

Other important advantages of prep-videos for the participants were the increase in self-confidence, being more comfortable and practicing speaking skills in English before micro-teachings. This finding is parallel to what Wu, Yen and Marek (2011) found in their study on the use of videoconferencing between EFL learners and native speakers of English. The results of their study showed that "well-designed videoconferencing for interaction" increased confidence and improved motivation among EFL learners (p. 126). EFL teacher trainees could be seen as advanced EFL learners who are still in the process of developing their English proficiency levels and prep-videos also helped them to rehearse what they would say in English before the micro-teachings. Increased level of collaboration with fellow teacher trainees was another advantage of prep-videos that participants mentioned. The fact that the teacher trainees went through the preparation for their micro-teachings and prep-video recordings in groups, the whole preparation experience enabled them to spend more time together and engage in more interaction. Liu (2012), who investigated the application of an online videocase discussion community among EFL pre-service and in-service teachers to promote professional development, stressed the importance of social interaction by stating "when developing different roles in discussing teaching practices, the preservice and inservice teachers did not learn individually. Instead, the social interaction among each other fostered both groups of the teachers to self-reflect and construct knowledge of teaching together." (p. 12). Thus, collaborative work in recording and viewing videos in teacher education may be more advantageous than individual work on the part of the teacher trainees.

Even though participants stated that they benefitted from the prep-video activity in general, they also stated several challenges they faced in the process of recording and viewing the videos. Some of the challenges were related to affective factors since participants feared of making mistakes in the recordings and felt nervous. Some participants also stated that micro-teaching activities required a lot of time to prepare and conduct and prep-videos caused extra work and time. Some participants developed negative attitudes toward prep-videos because they believed that recordings were "unnatural" or "artificial". This perception may the result of participants' not following the requirements of the prep-videos. Participants who believed that prep-videos were "unnatural" also stated that they recorded the prep-videos not as they were preparing their lesson plans, but after they finished their preparations. In a way, they took the "short cut" to record the videos, which prevented these participants from enjoying the process and seeing the value of prep-videos. Participants who followed the guidelines to prep-videos developed more positive attitudes towards the prep-video activity and they stated that they prep-videos were effective in helping them to be more prepared for micro-teachings.

Implications for EFL Pre-service Teacher Education

Teacher educators who wish to increase self-evaluation, reflection, collaboration, and interaction among pre-service teachers can use digital videos in the preparation stage of the micro-teaching activities. To increase the effectiveness of prep-videos, rationale behind these activities should be introduced to teacher trainees. Desirable and correct use of prep-videos can be shown as samples to prospective teachers so that the guidelines, nature, and value of prep-videos can be observed as well as implemented by teacher trainees. Kong, Shroff, and Hung (2009), who reported "on the development of a web enabled video system for encouraging student teachers to reflect on their teaching performance" (p. 554), support this idea by suggesting that:

Teacher training institutions should inform student teachers clearly about the rationale and process, and also remind them about the potential benefits and noteworthy issues, when using the system to scaffold the self reflection process. These initiatives help to increase student teachers' interest in and willingness to use the system (p. 555).

The quality of prep-videos can be assessed and rewarded in the grading system so that the "short cut" behavior observed in the work of some participants in this study can be avoided. In addition, prep-videos can be available in an online environment to allow peer assessment and collaborative feedback sessions. This way, teacher trainees can see each other's videos and learn from each other. Further study and research is needed to investigate whether teacher trainees would perceive prep-videos differently in other institutions and/or teacher education programs. As the participants in this study were EFL pre-service teachers, teacher trainees in other disciplines may have different view and applications with regards to prep-videos. Harnandez-Ramos (2011) states that "video is a natural 'bridge' to teachers interested in exploring interdisciplinary collaborations" (p. 37). Teacher trainees from different but related disciplines may share their videos and the effects of this kind of collaboration and interaction can also be studied as further research. Wildner (1999) claims:

…even though there are still many questions left unanswered as to how advanced technologies can be used most effectively in the FL (*Foreign Language*) classroom and as to how and by whom FL teachers should receive training in the use of teachnology, FL programs with teacher education programs have to react to the changing professional profiles of the workplace in globally oriented, information-based societies (p. 230).

It has been over a decade since Wildner (1999) made the claim above; however, the need to expose foreign language pre-service teachers to technology and train them in the effective use of it still remains. Digital video is only one but an essential technological tool in both teaching and learning. Therefore, one of the goals of teacher educators and researchers should be to continue exploring the effective use of digital videos in relation to pre-service teacher education in a various educational settings and a variety of participant profiles.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 12 ISSN 1309-6249

E-LEARNING ONLINE AND THE ROLE OF SOCIAL COMMUNICATION

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ABSTRACT

The topic of learning is one of the key factors leading to a competitive advantage in the contemporary globalized practice. The paper focuses on the issue of learning supported by ICT with a focus on innovative online teaching practices. Attention is mainly paid to the roles of social communication and social interaction in the process. The importance of the social interaction and communication is demonstrated by e-learning courses experience. A comparison of two different types of online courses based on blended learning, virtual teamwork and lecturing and its implications are presented there.

Key Words: Communication, interaction, virtual teamwork, blended learning, lecturing.

INTRODUCTION

Contemporary changes in the process of learning

The conception of learning has undergone a number of significant changes lately. There is a shift from teaching i.e. the traditional way of teaching when the teacher is providing knowledge or as Barr and Tagg say *"from the old paradigm a college is an institution that exists to provide instruction"* to learning which means active participation in gaining and sharing of knowledge among the participants of the educational process i.e. active spreading of knowledge, accumulation and sharing of data, the ability to properly evaluate and use the gained data or as Barr and Tagg shortly say *"to the new paradigm a college is an institution that exists to produce learning"* (Barr, Tagg, 1996).

Learning is seen more and more as an active individual process, where learners construct their own knowledge base. Learning is also increasingly seen as a process based on sharing and participation with different partners in a community, and is being viewed as a holistic constructing process which is interconnected with learners' social and cultural premises. Learning increases and teachers start to be more and more coordinators, mediators or tutors in this process.

A practical example of how these findings can be utilized is to be found for example in Senge's conception of a learning organization where people continually improve their abilities to reach the demanded goals. People in such an organization are permanently learning how to coexist and learn with others, they are slowly uncovering ways they can create and change reality. According to Senge this type of organization is based on the principle of the impossibility not to learn. (Senge, 1990)

The concept of knowledge has also changed from one of static transmitted contents, to knowledge that is ever renewable and often construed jointly with other learners. Knowledge creation is socially shared, and emerges from participation in socio-cultural activities

Learning can then be seen as a permanent test of experience and its transformation into data acceptable to the whole company and relevant to reaching the set goals. (Senge, 1990) According to Senge one of the most important prerequisites of this process of learning is systemic thinking.

While knowledge continues to be available in educational institutions such as schools and universities, it is increasingly located in workplaces as well as in everyday life, accessible through various media- and technology-based environments. Open access to knowledge creates new requirements for learners

Collective team learning is another very important component of this conception of learning. Collective team learning is based on effective cooperation of all team members. If this requirement is to be met the team-members have to be "tuned" the same way and the team has to become an efficiently working organism i.e. a system and not a group of individuals with different visions and often also completely different interests. (Senge, 1990).

Learning environments and learning are mostly **cooperative, collaborative**, and **supportive**. The goal is **not to transfer knowledge** but **to create environments** and **experiences** that help students to discover and construct knowledge for them, to make students members of learner communities that make discoveries and solve problems, and recognizing that the chief agent in the process is the learner.

E-learning

The ongoing and increasing tendency to optimize the use of ICT is one of the very important aspects of the European strategy for creating a strong knowledge economy which would secure economic growth and job opportunities. E-learning seems to be a great tool of increasing the efficiency of "learning". E-learning allows for a better connection between today's need of information and providing the chance to learn. E-learning also provides interactive multimedia able to catch and keep students' attention (Davenport, 2001).

That is why one of the main goals of today's e-learning activities should primarily be supporting new forms of work mainly in the area of self-studying and of what we call learning which means concentration on the development of learning in opposition to traditional teaching. There should of course be some degree of professional supervision by tutors. One of the key requirements of today's educational process is the development and the support of new methods of learning i.e. individual work with accessible data, the ability to search for relevant data, acquire information and work with it, exchange knowledge, share data, and accumulate findings.

Davenport's comparison of the amount of study material provides us with a very vivid example. In 1472 the biggest university library situated in Queen College, Cambridge contained 199 books. Today 300 000 new books are produced every year and there are more than two billion web pages on the internet (Davenport, 2001,:1).

The amount of data provided for us by modern technology is not the only aspect of the relationship between learning and attention that Davenport points out. He describes the time of traditional teaching as follows: during the time of the actual school education many of us directed their attention towards anything else but the education. Of course we can read, write, think and also research a little but we forgot a lot of things we thought we would keep. It did not help that we were formally educated from childhood till adulthood for our attention was directed towards fun with classmates, our changing bodies, the opposite sex, etc... It also did not help that teachers were trying to train us in keeping our attention, although experience tells us that even the teachers themselves were often not able to do that (Davenport, 2001: 2).

Davenport's thoughts tell us two things. 1. The number of hours and years spent at school does not mean concentrated attention and therefore gaining and keeping the required amount of knowledge. 2. Informal communication and social interaction are very important aspects of the process of education.

Of course e-learning is not some almighty tool of today's education but if it is understood correctly and therefore also used correctly it can help us to achieve the desired transformation of the educational system or in other words to change the paradigm in accordance with the changes of social reality in all aspects of human social existence.

The most progressive contemporary form of e-learning appears to be online teaching.

If multilateral social communication and social interaction are the key requirements of achieving success in the process of learning it is necessary to think about **which way of social interaction in the virtual environment i.e. the cyberspace we should support** and what forms of social communication we should use.

METHOD

Long-term analysis of feedback

Students of the Faculty of Business Administration at the University of Economics in Prague can choose from two courses provided by the Department of Managerial Psychology and Sociology one of which is an e-learning course online fully realized by means of the internet, while the other one is a course based on the principle of blended learning which is a combination of actual lectures and online teaching.

Both these courses are based on virtual teamwork. Students of the combined variant meet face to face during lectures while seminars are based on virtual teamwork. The long-term analysis of feedback offers a very interesting comparison of remarks made by students of the two courses. The comparative analysis concentrates on the sample of 120 students from each course in the years 2008/2009 and 2009/2010.

The students of the two courses answer given questions about the quality of communication in the two courses, about possibilities and character of social interaction, and other characteristics of the two courses. All comments and remarks are then analyzed as a part of a long-term qualitative research which serves mainly as a source of innovations for the courses. The following comparative analysis helps to discover and identify differences between the two types of courses.

FINDINGS

Evaluation of communication and social interaction in the courses

The outcomes of the comparative analysis clearly show that the students of the course realized fully by means of the internet are more aware of the significance and the need of mutual communication and social interaction in the process of learning. The comments made by these students show that at the beginning of the course there are often worries about how to start, realize and organize cooperation with others. These worries are caused by the fact that the students cannot meet physically with their colleagues, but have to cooperate with them and create a cooperative product.

very student of the course is aware of the fact that it is necessary to start communicating with others…*When I entered the web page of the course I found out that I would have to somehow start cooperating with the others . . . When entering the course for the first time I wanted to scream, hallo . . . people . . . here I am . . . where are you? ”*

On the other hand they are able to start active work and after making the initial contact with others they start using all the accessible tools of communication.

The students also very much appreciate the chance to acquire some experience with virtual communication. *"I think that this course was a great chance to try cooperation based solely on virtual communication. This course is great experience of communication, which depends only on virtual devices. The great advantage is the ability to work and communicate at any time. It is really very flexible to be able to work anywhere you are.*

The students of the course based on the principle of blended learning see e-communication used in seminars as a not very important addition to their face-to-face meetings. They use their momentary face-to-face contact after the lectures to deal with necessary organizational issues and teamwork is then often replaced by more or less individual work on isolated parts of the assigned task. The frequency of both the communication on the chat and of the use of other electronic tools of communication is much lower than in the fully online course.

It is clear that although there is a number of tools of electronic communication to choose from the students of the blended learning course prefer face-to-face communication … *we agreed on the individual tasks during the lectures and then I worked on my assignment by myself at home … During the lectures we exchanged materials, agreed on what would each of us work on and how the work should proceed and then we used the seminars to finish the final product before submitting it.*

I concentrated more on the lectures … we divided the seminar work ... each of us did his part of the work and the leader of the team then put all the parts together.

The students of the online course are more aware of all the possibilities offered by cooperating via the internet. Both the possibility of "borderless" cooperation and the possible uses of network cooperation in actual economic activity are appreciated much more by the students of the online course.

One of the requirements of the course is also communication among the teams which is supposed to ensure appropriate interconnection of the work in the course, sharing of experience and findings, and also informal exchange of opinions, remarks, ideas, etc... The frequency of communication among the teams has been very low in both courses so far. Remarks to other teams' works often connected with question about unclear points are the most common.
….In my opinion communication with the other teams was rather limited. We read their work and ideas and we even made some comments on those. They (and of course we as well) answered some questions from the other teams. But I find this communication rather shallow.

Nevertheless, the feedback analysis shows that the students appreciate the importance of communication among the teams and that they are interested in sharing the findings and broadening their knowledge. Various remarks suggest that the students are aware of the fact that communication among the teams is not sufficient and they are trying to propose measures which would improve this situation.

The students of the online course are much more active in this regard.

The findings of the analysis show that there is still much to make up for in both groups. The frequency of communication, as well as the content of messages and the flexibility of reactions on remarks is evaluated quite negatively by both groups.

On the other hand it is necessary to add that such a system of work has not yet built a tradition among the students. It can be said that the students are still getting used to this kind of cooperation and the ability of effective communication among the teams is still developing at the moment.

The students of the online course concentrate more on the communication inside the actual teams and their remarks and comments show that communication among the teams is often given only peripheral attention.

From the blended learning course students' remarks it is quite clear that since the students meet physically during the lectures they do not have any strong incentives to start any kind of team cooperation

There was not much communication among the teams. I read the drafts of the other teams' works but sometimes I didn't know what I should remark...

It took me some time to notice that one of the teams had commented on our project. Since nobody from our team replied to the comment, I decided to reply myself but I did it quite late and I did not have time to discuss my reply with the rest of the members of our team.

The fact that the course combines online learning with traditional lectures in a lecture room is probably causing that the students tend to view communication from the point of view of traditional teaching and they limit the time spent in the CMS environment to minimum.

The appreciation of the importance of mutual communication and of the development of the ability of social interaction is much higher in the fully online course. The students of this course appreciate much more their active role in the process of acquiring knowledge, developing skills in using ICT to work and they are also aware of the responsibility for the creation of a cooperative project.

The connection of the students of the blended learning course with the traditional form of studying appears to be quite strong, they prefer meeting face to face and they often overlook the possibilities of active work in the CMS and also of work by means of the internet.

Regarding the offer of tools of electronic communication it is possible to say that the students of the fully online course tend to use these tools much more often than the other group. Although there is a possibility of a face to face meeting if the students of the online course agree on such a meeting, it is hardly ever used.

On the other hand the blended learning course students use this possibility much more often. They meet informally on the school premises as well as other places more often than the other group. Although there is a place where they can meet flexibly regardless of time and space they prefer meeting in person to meeting online.

The findings of the analysis further show that there are some differences in the ability to agree on how to organize the teamwork. The biggest difficulties are with dividing the work in the team and with assigning individual tasks. The students of the blended learning course tend to rely more on the teacher who according to their comments can help them or give them some advice.

CONCLUSSION

Perspectives

It is possible to claim that ICT have become an indispensable part of the process of learning. On the other hand it is quite clear that it is still necessary to improve and strengthen the abilities to work by means of ICT. Together with improving the concept of e-learning it is also necessary to improve the abilities to share findings, exchange experience and also the ability to adopt new ways of actively teaching each other. The transformation of traditional teaching into desired learning is not without obstacles and it requires a complex view of the possibilities and opportunities to strengthen the autonomy, activity, and also the responsibility for

learning itself. Social communication and interaction can help this process a lot even though they are realized by means of technology.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 13 ISSN 1309-6249

A STUDY ON SOCIAL SUPPORT PERCEPTION OF PARENTS WHO HAVE CHILDREN WITH AUTISM

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ABSTRACT

The Purpose of this study is to examine the social support perception of parents who have children with autism. Data was collected from 672 parents who have children with autism in Turkey. In the study, it was researched whether the social support resources, household income per month, household socioeconomic status(SES) group, gender of children with autism, labor status of mother and living area parameters are important predictor of social support perception of parents or not. For that purpose, firstly, descriptive statistics and correlation values of the related variables and then, the predictor analysis results are given. During the study, the predictor variables, gender of children, labor status of mother and living area, were counted in analysis by converting them to dummy variable, because of that they are categorical variables. Significance level is accepted as .05 for the study. Data of 26 people were omitted from the analysis because, their data was considered as extreme values due to their Mahalanobis distance values are higher than criteria value [$x^2(6)= 16.81$, according to $p=.01$] in total 672 data sets thus, research group number are defined as 646. Predictor identification of social support perception of parents was done through 'Stepwise Multiple Regression Analysis'. According to the findings of study it was found that family social support and sub field perception of parents who have children with autism is on the average; while the highest perception is in emotional support sub field, and the lowest perception is in care support sub field. According to the predictor analysis findings of the study, it was found that the most important predictors of the social support perception were the social support resources formed by family, friends or significant other of. It was stated that the densest support resources amongst all is family. In study, it was found that household income per month is the secondary predictor of social support perceptions of parents; however, household SES group, gender of child with autism, labor status of mother and living area are not important predictors of social support perceptions of parents.

Key Words: Parents who have children with autism, social support resources, social support types.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 13 ISSN 1309-6249

INTRODUCTION

Autism is classified as a main sub group in pervasive developmental disorder and it is come up with (a) social interaction (b) having a delay or/and unusual functionality in language or symbolic and imaginary games, which are used in social communication (c) various fixations. Reluctance of social interaction with other people, limitations in eye contact, inability in especially symbolic and imaginary activities such as game can be seen in children, who are showing autistic traits depending upon these inadequacies (DSM-IV-TR, 2007). Autism/autistic disorder is a lifelong inadequacy (Centers for Disease Control and Preventation, 2007). "Autism", which has an important place in developmental disability area, is an inadequacy type that affects coping adequacy, general adequacies and life quality of each family member (Schalock, 2000). Autism affects whole family (Lindholm, 2007). It is known that the effects of an individual with a developmental disability on his/her family are more intensethan children who show normal development. In addition to this, it is known that autism has more advanced effects on family in comparison with other disabilities. Reason for that is autism has multiple effects on communication, emotional and information-processing processes, cognitive, social and behavioral fields of child development. Families with autistic child are face to face with more stressors (stress resources) than families who have other disabilities (Schunterman, 2002).

One of the most important factors in efforts of families for coping with stress and attunement due to having a child with developmental disabilities is the internal and external resources of crisis overcome of the family. These resources includes family members' personal resources, family role structure and features related to family that contributes to organization and close society of family such as relatives, neighbors, friends, professionals and the other institutions in society's social support (Minnes 1988; Sencar, 2007). Social support, which enables individual are loved, are valued, are cared, reducing negative results of a crisis, a change in his/her life and getting easy to adaption of critical life event and protection of psychological health, can be defined as an emotional, physical, informative, instrumental and monetary helps provided by people around individual (Gallagher, Beckman, and Cross 1983; Kaner, 2004; Cobb, 1976; Dunst, Trivette and Cross 1986; Çakır and Palabıyık, 1997; Ünlüer, 2009). Family social support means various support types. These are, in family home environment, towards the child and the family, which have developmental disabilities and includes: (a) money management, (b) services, provided via professionals, (c) supports from other individuals and units, (d) foods and products, (e) combinations of services (Turnbull, Summers, Lee and Kyzar, 2007). Social support provided to families includes supports that are needed by families in home environment and functional canalization of whole family. Family social support enriches family's life quality by guiding family in order to family member, who has developmental disabilities, to achieve the desired aims, which are defined within the framework of developmental disability policies, and family member to have a better position in society. Family social support improves individual's, who has developmental disability and his/her family's life effectively. Family social support mediates policies and practices, that toward to family and family member with developmental disability, to be more effective (Wang and Brown, 2009). Social support patterns for families with a child, who has developmental disability, are divided into two as formal and informal. Formal social support systems are perceived as to be given by professionals and informal support systems are perceived as family members, friends and being a member of social groups that are integrated into family's daily life.

Formal support resources can be family therapist, family education professionals etc. Informal support can be provided by family members; friends, neighbors, family support groups (Dunst et al., 1986). Informal support is more efficient than formal support for protection from negative effects of stress (Boyd, 2002). Researchers reported that although relatives, friends and neighbors are willing to provide emotional support to the family with a developmental disability having child, support level of them towards practice is low (Brown et al., 2003; Werner, Edwards, Baum, Brown, Brown and Isaacs, 2009). As social support level of families with a developmental disability having child increases, it is seen that parents behave more positive towards child, interact with child more positive while playing game and behaviour development of disabled child is more

positive. Also, children have less physical limitation, behavioral problem and more social acknowledgment and power of personality trait if their parents have more supportive social network (Dunst et al., 1986). It was observed that mothers of children with anautism have less depression and worry if they get more soical support (Gray and Holden, 1992). Limited social support causes withdrawl from stress reducing social activities, which is a negative effect (Boyd, 2002).

Another main effect on family is 'poverty' in terms of household income and socioeconomic indicators. Poverty can be expressed as having a less total household income, of family and family members, than the income level limit determined by related organizations (Dalaker, 1999). Recent studies show that there is a relation between income and inadequacies. Elder, Nguyen and Caspi (1985) indicated that income inadequacy (poverty/poorness) caueses to limit the family competence for positive familiy interactions and less parenting satisfaction. It was observed that high income helps to have more choices in terms of marriage satisfaction and coping strategies. Also, it was found that having a high income aids family in terms of adapting to disability and meeting health and dailylife demands that were brought by individual who has developmental disability (Yau and Li-Tsans, 1999). It was seen that marriage satisfaction increases as family income increases (Willoughby and Glidden, 1995). Poor families who have a child with developmental disability are affected from poverty more than poor families with a normal developed child and wealthy families who have child with a development disability (Fujiura and Yamaki, 2000). Recent demographic studies showed that there is an increasing relation between the poverty and developmental disability risk (Fujiura and Yamaki, 2000; Kaye, LaPlante, Carlson and Wenger, 1996; Seelman and Sweeney, 1995).

It can be mentioned that there are limited numbers of studies about the examination of social support perception of parents who have children with autism in our country. In a study carried out with 165 mothers, who have a child with autism age between 3 to 7, it was seen that income per month is a predictor of those mothers', who have an child with autism, perceived social support level (Görgü, 2005). In an another study carried out with 92 parents who have a child with autism age between 2 to 6, it was specified that perceived social support level of those mothers, with children with autism, varies with perceived income. (Ünlüer, 2009). In a study, 172 parents who have a child with autism are compared with 172 families with a normal developed child, there is a significant difference between two familiy groups about perceived soical support width level (social support resources) and thus, parents who have a children with autism have lower perceived social support width level than families with normal child (Sencar, 2007). In another study related to the topic it was observed that social support pleasure of parents who have child with autism or child with mental disabilities increases with the number of support resources (Yurdakul and Girli, 1997). With reference to this limitation in our country, social support perception of parents who have a child with autism is determined as research topic. In the study, answers for the following questions are searched:

- What is the 'social support' and sub field perception level of parents who have children with autism?
- Are social support resources (family, friend and significant other) and certain sociodemographic parameters (household income per month, household SES group, gender of children with autism, labor status of mother, living area) important predictors of social support perception of those parents with children with autism?

METHOD

Research Model

In this study, carried out correspondingly to the 'survey research', 'causal comperative model' which is a sub-dimension of correlational reserach is used (Fraenkel and Wallen, 2006; Büyüköztürk, Kılıç, Akgün, Karadeniz and Demirel, 2009). 'Stepwise Multiple Regression Analysis' is used in order to determine the effects of predictor parameters of social support perception of parents who have a child with autism, in the study. Predicted parameter of the study is social support perception of parents; predictor paramaters are social

support resources (family, friend, significant other) and housheold income per month, houshold SES group, gender of disabled child, labor status of mother, living area.

Research Group

For the purpose of investigating social support perception of parents of child with autism, data were collected from 672 parents (mothers) who have children with autism. 26 datawere omitted via "Mahalonobis Distance Analysis", which was used to remove the extreme values of data collecting set, thus, research group consisted of 646 parents of children with auitsm. When it is looked to the important sociodemographic characteristics of family members of children with autism (mother, father, child and family respectively) most of mothers are at the age between 35 to 44 (n=306-%47.4). Mothers of children with autism are mostly graduated from primary school (n=278-%43.0). Mothers of children with autism are mostly nonworking/housewife (n=549-%85.0) and therefore, working weekly working hours are zero. It is found that mothers of child with autism are mostly married (n=585-%90.6). Fathers are at the age between 35 to 44 (n=352-%54.5) generally. It was found that they are mostly graduated from primary school (n=189-%29.3) and are working at physical or body strength based works as a wageworker (n=268-%41.5). Father's weekly working hours are mostly more than 40 hours (n=327-%56.6). It was observed that most parents who have children with autism have 2 children (n=329-%50.9) and they have at least one normal developed child along with children with autism. Most of children with autism are at the age between 7 to 14 (n=510-%78.9) so, they consists of mostly children at primary school age. When the gender parameter is looked, there are 517 (%80.0) male and 129 (%20.0) female students. It was found that 322 (%49.8) students have heavy level learning disabilities, 244 (%37.8) students have medium level learning disabilities and there 40 (%6.2) students for light level and 40 (%6.2) students for very heavy level learning disabilities in terms of inabilty effects. When it is looked for 'second inability', 548 (%84.8) students have no second inability however, 98 (%15.2) students have additional inability in either vision, auditory, speech, orthopedy fields.

When family type of child with autism is looked, it was found that most family have nuclear family form which consists of mother, father and unmarried children (n=552-%85.4). Living area of families who have a child with autism was investigated in terms of urban-rural classification, 489 (%75.7) families live in urban and 157 (%24.3) families live in rural areas. According to that it was observed that %75.7 of families are urban settled family and %24.3 of them are rural (town+village) settled family. Househlold income of families who have child with autism were investigated and found that most of families have income range between 901 to 1500 TL (n=205-%31.7) and have range between 0 to 600 TL (n=181-%28.0) per month. When it is looked to socioeconomic status/level(SES/SED) group distribution (A, B, C1, C2, D, E, which is based on education and occupation's scores of families who have children with autism), it was seen that most families are in C2 low SES group (n=222-%34.4) and C1 low SES group (n=221-%34.2).

Instruments

In this study, that is aimed to examine the social support perception of families who have child with autism, information about the demographic and various parameters of families, who have a child with autism, gathered via 'Sociodemographic Family Information Form'. Two separate scales were used to determine the social support perception of parents who a child with autism. The first one is Family Support Scale which is used to determine social support type and the other one is Multidimensional Scale of Perceived Social Support that is used to determine social support resources.

Sociodemographic Family Information Form

Sociodemographic Family Information Form is created by researcher in order to determine the features of family of child with autism in terms of various demographic parameters. There are different questions on the form such as mother and father's age, educational background, occupation, weekly working hours, houshold income per month, family type and number of children they have along with age of, inadequacy level of and gender of child who have developmental disability etc. Turkish Statistical Institute's (TUIK, 2010) classification

was used for age and income classification. Besides, numbers of questions, to calculate mother, father and education and occupation scores of father of houshold head, are embedded into form in order to specify the SES group of family members. On the purpose of determining the household SES groups, interpretation of some questions on the sociodemographic information form were done accordingly to the Socioeconomic Status (SES) Scale-2006 Paired Household Form (Çağlı et al., 2006) which was particularly used by various user groups such as large scaled media research, advertiser, advertising sector, marketing sector, marketing research sector. Prominent feature of SES form is while specifying the household SES group (A=33 points and more, B= between 12 to 33 points, C1= 2 to 12 points, C2= -2 to 2 points, D=-7 to -2 points, E= lower than -7 points) education and occupation scores of attendant or individuals related to attendant are used rather than household income.

Family Support Scale (FSS)

Family Support Scale (FSS) is a scale which consists of 34 items and is developed by Kaner (2004) in order to examine social support perception of families who have a child with developmental disability. As a result of Family Support Scales' (FSS) factor analysis, it was seen that five factors together clarify %60.959 of total variance. Results of factor analysis indicates that FSS have five factors (Emotional Support- ES = 9 items, Information Support- IS= 8 items, Care Support-CS=5 items, Affiliation Support –AS= 6 items and Financial Support –FS = 3 items). Cronbach Alfa values of FSS were calculated as .94 for sum of scale and .84 to .90 for subfields. Split-half reliability coefficient of scale was found .81 to .88 for subfields and .84 for whole scale. It was observed that test retest reliability of FSS changes between .95 to .99 for subfields and .99 for whole scale. Studies show that the reliability and validity is at the desired level. Attendants/answerers answer the items on FSS either choosing one of the options always (3), sometimes (2), never (1). Points gathered from whole scale can be interpreted along with the sub fields. The lowest and the highest score for subfields can be between 1 and 3 times the number of item (Lowest score: 31; highest score: 93). High score from FSS indicates that parents have supports that help them to meet the demands of special care needed child and low score from FSS indicates that the parents are lack of those supports. Furthermore, with the last 3 frequency questions, it was tried to found that interaction frequency of parents with affiliations and frequency of social area participation of parents (Kaner, 2004).

Multidimensional Scale of Perceived Social Support (MSPSS)

'Multidimensional Scale of Perceived Social Support (MSPSS) (Eker, Arkar and Yaldız, 2001; Zimet, Dahlem, Zimet et al., 1988)' was used in order to specify the social support resources for families who have a child with autism. MSPSS is a scale and was developed by Zimet et al. (1988) in USA and which is easy to use, formed by 12 items and it evaluates subjectively the social support of three different resources (family, friend and significant other). It includes social support resources related three groups which each of them consists of four items. Suggested sub scale structure includes support from "Family", "Friend" and "Significant other". Internal consistency and test re-test correlations of scale and sub scales are sufficient. In the study carried out by Eker et al. (2001), study samples are 150 individuals as formed by three groups; psychiatry, surgery patients and normal peoples. Reliability (Cronbach Alpha) coefficient of MSPSS for whole samples were calculated as α=.89. In the same study it was found that MSPSS's and its sub scales' internal consistencies found in acceptable level. In the scale, each item was scaled by using 7 levels scale between absolutely no =1 and absolutely yes = 7. In this study each sub scale points were acquired via summation of four items in sub scale and whole sub scale points were summed to obtain whole scale score. Higher obtained score means higher perceived social support. Factor structure, reliability and structure validity of MSPSS's Turkish form were found satisfactory in general (Eker et al., 2001).

Data Analysis

Social support perception of parents of child with autism was analyzed through averaging and standard deviation calculations. Predictor analyses of family's social support perception were done by using (Büyüköztürk, 2007) 'Stepwise Multiple Regression Analysis', which based on prediction of dependent variable

in general, in terms of two or more independent variables(predictor variables) that are related to dependent variables. In order to carry out multiple regression analysis, it is needed to be met various assumptions. For this purpose, before the regression analysis, scatter diagrams, histogram and normal distribution graphs were studied in order to meet 'linearity' and 'normality' assumptions.

'Mahalanobis Distance Values' were used in order to figure out that whether there is any extreme values in data sets or not and if any data labeled as extreme, it was omitted from data set. Another assumption in multiple regression analysis is that there should not be any simple linear relationship between the independent variables. For that purpose, "Multicollineartiy" were researched among the data. Another interpretation related to this assumption can also be done as the following, variance inflation factor (VIF) value is lower than 10, which was chosen as limit, and very close to 1 (Field, 2005) and tolerance value is higher than .20, which was chosen as limit. VIF and tolerance values were studied for that purpose. Furthermore, relation between errors terms (autocorrelation) were also studied according to Durbin-Watson test results. This mentioned value generally should be between the desired values 1 and 3 (Field, 2005). Dependent and independent variables in regression analysis should be measured in least equal interval scale as continuous variables (Büyüköztürk, 2007). In this study, child's disability type, labor status of mother and living area parameters, which were considered as predictor parameters, were included in analysis by converting them into dummy parameters as they are categorical parameters. Significance level was determined as .05 in the study. Data were analyzed via PASW Statistics 18.0 (SPSS Statistics) software.

RESULTS

Analysis findings of social support perception of families who have a child with autism and prediction levels of social support perceptions of families by social support resources and various sociodemographic parameters were provided in accordance with the study purposes.

Findings about Family Social Support Perception of Parents of Children with Autism and Subfield related Perception

Family social support perception level of mother and subfield perception levels' average and standard deviation values are provided in Table 1. Evaluations were done over 646 participants who are remained after Mahalanobis distance value analysis in order to omit extreme values.

Table 1: Social Support Perception of Families who Have Children with Autism (N=646)

Variables	Minimum	Maximum	$\overline{X}$	SS
Family Social Support Perception_ general total	31.00	93.00	69.28 (3.72)	13.49
Emotional Support subfield	9	27	21.28 (3.94)	4.54
Information Support subfield	8	24	18.74 (3.90)	3.74
Care Support subfield	5	15	9.45 (3.15)	2.92
Affiliation Support subfield	6	18	13.49 (3.74)	3.15
Financial Support	3	9	6.29 (3.49)	1.90

When Table 1 is investigated, it can be seen that average family social support perception of families who have a child with autism is 69.28 (five ratings equivalent 3.72), and the standard deviation is 13.49. In terms of family social support subfields, arithmetic average of families' emotional support subfield is 21.28 (five ratings equivalent 3.94), standard deviation is 4.54; arithmetic average of information support is 18.74 (five ratings equivalent 3.90) and the standard deviation is 3.74; arithmetic average of care support is 9.45 (five ratings equivalent 3.15) and the standard deviation is 2.92; arithmetic average of affiliation support is 13.49 (five ratings equivalent 3.74) and the standard deviation is 3.15; arithmetic average of financial support is 6.29 (five ratings equivalent 3.49) and the standard deviation is 1.90. In these findings, it was found that family social

support perception and subfield perceptions of families who have a child with autism is the average; the highest perception is in emotional support subfield and the lowest perception is in care support subfield.

Social interaction levels, in terms of social support network, of families who have a child with autism were tried to be determined with the last three questions from the Family Support Scale. When it is researched that meeting frequencies of attendants with closest relative, friend, neighbor or such people, it was found that 2-3 times a week(%23.8) they meet with related people face to face and 2-3 times a week (%31.1) meet on telephone with related people and related people performs home visit to families who have a child with autism 1-2 times a month (%45.2) and families with children with autism go out 1-3 times a week (%58.2) to participate in social environments.

Findings about Prediction of Social Support Perception of Parents of Children with Autism

In the study, household income per month, household socioeconomic status (SES) group, gender of child with autism, age of child with autism, mother's age, labor status of mother and living area parameters were researched along with social support resources (family, friend, significant other) in terms of whether those parameter are an important predictor of social support perception of families who have a child with autism or not. For this purpose, firstly, descriptive statistics and correlation values of parameters, subject to research, then stepwise multiple regression analysis' results were given. In the study, gender of children, labor status of mother and living area parameters, which were considered as predictor parameters, were included in analysis by converting them into dummy parameters as they are categorical parameters. Significance level of the study was specified as 0.5. During carried out researches, in order to find that data are suitable for multi regression analysis, in study it was found that scatter diagrams proved a linear relationship, histogram and normal distribution graphs showed that there is no significant deviance from normality. Furthermore, in order to investigate the assumption of multivariate normality, Mahalanobis distance values were calculated to find out that if there any extreme values exist for parameters used in analysis. In this framework, 26 individuals data are omitted from total 802 data sets and not included in analysis due to having a higher value than Mahalanobis distance values criteria value [$x^2(8)= 20.09$, according to p=.01]. So, it was guaranteed the assumption of multivariate normality for data. In order to guarantee that data have normal distribution, research group number was determined as 646 individual after Mahalanobis distance analysis.

Before stepwise multiple regression analysis, in order to guarantee the assumption that not to have multicollineartiy, correlation values between social support perception of families and continuous variables; family social supports, household income per month, household SES group; were studied and related values were given in the Table 2.

Table 2: Correlation Values between Social Support Perception of Families, Social Support Resources and Household Income

Variables	**1**	**2**	**3**
1. Social Support Perception of Families	-		
2. Social Support Resources	.68**	-	
3. Household Income per Month	.18**	.15**	-

*p<.05; **p<.01; ***p<.001

When it is looked to Table 2, the highest and the most significant relationship are between household SES group and household income per month (r=.65, p<.001). When correlation coefficients (above .80 means multi connection) are taken into consideration in this context, there is no multicollineartiy problem between parameters. Again multicollineartiy statistical values were studied in terms of Collinearity Statistics values from the Coefficients table, it was seen that variance inflation factor (VIF) value changes between 1.00 to 2.12 and

total values are below the criteria value, 10, and very close to 1 (Field, 2005). Furthermore, it was observed that tolerance value changes between the .47 to 1.00 and whole values are above the criteria value, .20 (Field, 2005). Whole those values show that analysis has no multicollinearity problem. When the relation between error terms (autocorrelation) were searched, it was found that result of Durbin-Watson test is 2.00 and that value is between the criteria values, 1 to 3 (Field, 2005) thus, it can be said that there are no autocorrelation in analysis.

'Stepwise Multiple Regression Analysis' were done in order to specify the prediction capacity of following parameters of social support perception of families : Social support resources, household income per month, household SES group, living area (dummy)[a] and labor status of mother (dummy)[b]. Findings are given in the Table 3.

Table 3: Stepwise Multiple Regression Analysis Results about Prediction of Social Support Perception of Families (N=646)

Model	Variable	Partial r	R	R^2	ΔR^2	F	ß	t
1	Social support resources	.68	.46	.46	557.61***	.68	23.61***	.68
2	Social support resources					.57	23.03***	.67
	Household income	.68	.47	.008	287.22***	.08	3.08***	.12

*p<05; **p<01; ***p<001

Two (2) different regression models were obtained as a result of multiple regressions. When the explanatory power is taken into account according to the Table 3, social support resources significantly explains %46 (.464) of total variance. In the lights of correlation coefficient has high relation between .70-1.00, has mid-level relation between .70-.30 and has low relation between .30-.00 (Büyüköztürk, 2007), it is observed that there is a mid-level and positive relation between social support resources and family's social support perception (r=.68; **p<.01) (see Table 2). When explanatory rate of variance and correlational relation are taken into consideration, it can be said that social support resources, formed by family, friend and significant other, are the most important predictor of social support perception of parents and social support perception increases with the support provided by social support resources. It is seen that household income per month contributes to explanation of total variance at very low level %008 (.008). It was found that household SES group, gender of children with autism, labor status of mother and living area parameters, which could not be used to explain variance, stayed out of the model and their coefficients are not significant. In the lights of standardized regression coefficients, ß (beta), of multiple regression analysis, the highest beta value means the relatively most important predictor (Büyüköztürk, 2007). According to the standardized regression coefficient (β) the most important predictor parameter on family social support perception is social support resources and the relatively important parameter is household income per month. The densest support is taken from family members rather than friend or significant other among the social support resources.

With all these findings lights, social support resources, in the form of family, friend and significant other, are the most important predictor of social support perception of families. It can be said that household income per month is the second most important predictor of social support predictor of families; household SES group, gender of children with autism, labor status of mother and living area parameters are not significant predictor of family social support perception.

International Journal on New Trends in Education and Their Implications
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DISCUSSION

In the study, data wascollected from 646 families in order to find the predictor relation about social support and subfield perception levels of families who have child with autism. Findings show that, social support and subfield perception levels of families who have child with autism is above the average; while the highest perception in emotional support subfield, the lowest perception in care support subfield. Attendant families social interaction levels founded to be high when the social interaction levels of families who have a child with autism is researched as part of social support networks in terms of meeting frequency with closest relative, friend, neighbor and such people. According to that, it is seen that families with children with autism do not have any problem about obtaining emotional support. Emotional support means that existence of someone with whom individual can talk personal problems and special subjects (Kaner, 2004). While emotional support means an existence of someone with whom individual can talk personal problems and special subjects, job oriented and practice support corresponds to support in instrumental support types more. 'Care support', which includes support of child's care in daytime, night or weekends and support in transportation, is on the first place of that kind of support types (Kaner, 2004). In parallel with the findings of this study, most families who have a child with developmental disorder, reports that although relatives, friends and neighbors are willing to provide emotional support, their care support is lacking (Brown et al., 2003; Werner, Edwards, Baum, Brown, Brown, & Isaacs, 2009). So, it can be said that enhancement of social support perception of families who have children with autism can be achieved by carrying out encouraging studies about care supports along with emotional support.

In the study, it was found that social support resources, which formed by family, friend and significant other, is the most important predictor of social support perception of families, according to the stepwise multiple regression analysis results. According to the correlative and predictive relationship between social support resources and social support perception of families, found in the study, it can be said that social support perception of families increases with the amount of taken support from social support resources. Having the highest social support level in emotional support subfield and a high social interaction levels, claim that there is a strong predictive relation between the social support perception of families who have children with autism and social support resources. Findings from other studies done in our country also support this finding. In the related studies it was stated that social support perception increases with social support resource (Sencar, 2007; Yurdakul and Girli, 1997).

In study, according to results of stepwise multiple regression results it was found that household income per month is the second most important predictor of social support perception of families. It was found that household SES group, gender of children with autism, labor status of mother and living area parameters are not important predictors of family social support perception. In parallel with the findings of study, it was found that income per month is an important predictor of perceived social support level of mothers who have child with autism (Görgü, 2005; Ünlüer, 2009). If the household income of families who have child with autism is investigated, it is seen that most families have income per month between 901-1500 TL and 0-600 TL. It can be said that %59.7 of families who have child with autism, live below the poverty threshold according to the August 2011 data (poverty threshold is 2 thousands 693 TL) of Memur-Sen. Consequently, the improvements in financial support sub-field among social supportscan increase the common perception about social support.

According to the findings of the study it can be said that although having a high amount of emotional support, parents of child with autism need a job oriented and practice support in terms of insufficient care support. It can be interpreted in two ways that having the densest social support resource from family members, connective effect of autism over family along with destructive effects of autism.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 13 ISSN 1309-6249

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 14 ISSN 1309-6249

DESIGNING AND IMPLEMENTING AN INNOVATIVE MASTER'S DEGREE PROGRAMME: A CASE STUDY

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ABSTRACT

Innovativeness has become a major competitive factor for companies, networks and regions, and renewal is very important for any business. The purpose of this paper is to increase knowledge of how education can contribute to new kinds of innovative business competences. The paper analyses the design and implementation processes of the new Master's degree programme in Service Innovation and Design targeted for practitioners. This is an action research based case study. The profound analysis of the case material and the participant observations during the four-year process show that the main issues related to the success of a new master's degree programme tend to be (1) clear objectives, (2) extensive research on future competence needs, (3) a committed and strongly led development team, (4) comprehensive networks with the key players in the competence area, and (5) a thorough documentation of the whole process as a basis for continuous development.

Key Words: Master's degree, curriculum, business studies, service innovation, action research.

INTRODUCTION

The demand for service innovation and design (abbr. SID) competences has rapidly increased among companies and other organisations across all industries (e.g. Ostrom et al., 2010). Fundamental changes in the economic environment, demographics and new technologies are driving businesses to seek sustainable efficiency and effectiveness through new, service based business models. Innovativeness is a major challenge for companies (e.g. Freel, 2005). Companies have to offer continuously improved or totally new service concepts to remain one step ahead of the competition and at the same time complying exactly with customers' latent needs and expectations (see e.g. Edvardsson et al., 2006). The importance of service innovation has enormous implications for competences and the knowledge base that underpins them (Ojasalo, 2009). More emphasis has to be laid on an ability and sensitivity to anticipate changes in customers' behaviour and expectations, and in the consequent competence to design better value propositions and create new service concepts. Business managers and developers need to understand service value from the customers' perspective, create a vision, develop it and put it into action. To create profitable business, they should be able to design definable, repeatable, scalable and unique service concepts (Ojasalo, 2009).

Consequently, several national and international research projects and government and industry reports have underlined the increasing need for service innovation and design competences (e.g. Succeeding through Service Innovation, 2008; Supporting Innovation in Services, 2008; The Future of Service Business Innovation, 2010). To answer this need, Laurea University of Applied Sciences in Finland has developed a new Master's degree programme in Service Innovation and Design. This unique degree programme in Service Innovation and Design aims to create the distinctive competences needed for future success. The main objective of the degree programme is to provide education which is based on the genuine competence development needs of companies and other organisations. The Master's degree programme in Service Innovation and Design was launched in 2009 after two years of intensive development work. It is a 90 ects credit-point professional

program that trains students from diverse backgrounds to become practicing service developers. The entry requirement for Master's studies at Finnish universities of applied sciences is that an applicant hold a Bachelor's or Master's level degree and has acquired at least three years of relevant work experience after graduation. The final selection for the degree programme takes place through an entrance examination. The SID Master's degree programme is provided in English and can be completed alongside a full-time job in 18 – 30 months.

When designing curricula, universities have to balance needs and desires of diverse stakeholders, and curriculum design is influenced by both external and internal factors (e.g. Nash, 2002). Strong external influences come typically from employer concerns, the job market, publications, and society in general. Internal influences include for example educational beliefs, disciplines, institutional purpose and mission, as well as student characteristics. Increasing enrolment, responding to students' and employers' needs, as well as internationalisation are typical general objectives of curriculum design (Jackson, 2003). Many universities, concerned with providing curricula that are current and targeted to both student and employer needs, are tailoring their curricula to target specific skill sets (Phillips, Settoon & Phillips, 2008).

In creating a curriculum, the main challenge lies not only in renewing the outcomes and contents of teaching to better respond to the future needs of the business environment; the changes in the environment seem to be so large that the curriculum should also find new ways to facilitate the continuous development of the region and of business through research, development and innovation (abbr. RDI) activities. The aim of the curriculum is therefore to create flexible conditions for the content of learning to arise from practical activity (Kivelä & Ojasalo, 2007).

At a general level, the development process of university curriculum is in line with any development process. A typical curriculum development process includes the phases of setting objectives, planning, implementing, assessing, and continuous development. In Twining's (2004) approach, curriculum development starts from the (1) vision, which is followed by a planning cycle consisting of four consecutive stages. They are (2) planning, (3) implementing, (4) assessing, and (5) evaluation. Twining and Richards (1999) mention that this is an oversimplification. In reality, each stage is not discrete and one may begin at any point in the cycle and will not always follow through the whole cycle in order. Nevertheless, the implementation stage bridges the intentions with what is achieved, and the evaluation stage helps the developers refine the plans for future action.

The purpose of this paper is to increase knowledge of how education can contribute to new kinds of innovative business competences. It shows how the need for new competences is found and analyzed and how the new degree programme is planned, implemented, assessed and continuously developed. The methodological approach of this paper is an action research based case study. The case of the study is the Master's degree programme in Service Innovation and Design. The initial design process took two years, starting from the initiation of the project in 2007 and ending up to the point when the first students began their studies in the programme in 2009. During the on-going implementation process the further development of the programme has continued. The remainder of this article is divided into three sections. Next, the method of the study is described. Then, in the Findings section shows how (1) the objectives for the new degree programme have been set and the curriculum designed, (2) the degree programme has been implemented, and (3) the degree programme has been assessed and continuously developed. Finally, the findings are discussed and conclusions drawn.

METHOD

This article is an action research based case study. Next, the characteristics of action research, case study and their use in the present study are briefly explained.

The idea of action research was introduced by Lewin (1946) and several definitions have been provided for action research (Kemmis & McTaggart, 1988; Oja & Smulyan, 1989; Zuber-Skerritt, 1992). In action research the purpose is, at the same time, to develop solutions to practical problems and to develop knowledge or academic theory. The person involved with conducting action research is a change agent in practical problem solving and also an academic researcher developing scientific theory (Gummesson, 2000). According to Rapoport (1970, p. 449), "action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework." In other words, a researcher faces two goals, one goal is to solve a practical problem within an organization, and the second is to generate new knowledge and understanding about other organizations (McKay and Marshall, 2001, p. 46).

Case studies have often applied the action research approach successfully (Howell, 1994). The case study approach implies the detailed examination of a single example of a phenomenon. A case study allows a research to retain the holistic and meaningful characteristics of real-life events, such as organizational and managerial processes (e.g. Gummesson, 2000; Yin, 1984). The empirical evidence of a case study may be qualitative, quantitative, or both. Sources of evidence in the data collection for case studies can include interviews, direct observation, participant-observation, documentation, archival resources, and physical artifacts (Yin, 1984).

The author of this article has been the head team designing and implementing the new Master's degree programme in Service Innovation and Design (SID). Thus, she has had the two roles of an action researcher: academic researcher and practical change agent. The design process started in 2007, and the first students began their studies in 2009. The design and implementation processes have been truly collective involving a great number of stakeholders. In the beginning, the development team was composed of four faculty members. In autumn 2008, a few more faculty members (lecturers) became involved in the team with the purpose of curriculum development. In November 2008, seven of Laurea's faculty members took part in the international Service Design Network seminar in Amsterdam where the curriculum was further developed with other seminar participants. As the degree programme was launched in autumn 2009, there were ten members in the team of lecturers, and the figure grew to 12 by autumn 2010. The team of lecturers has had regular development meetings (2-3 hours) approximately every second month. One-day development workshops have been arranged for the lecturer team at the beginning of 2009 and 2010, and half-day workshops in 2011 and 2012. Currently, in 2012 when the third application period for the programme is starting, there are 16 lecturers in the team responsible for the further development and implementation of the degree programme. Moreover, the students and business partners are also involved in the further development of the programme.

The current analysis of the design, implementation and assessment of the programme is based on direct and participant-observations during the process and the following written documents:

- Memos of the SID degree programme lecturer meetings in 2007-2011
- SID degree programme application report for the Ministry of Education and Culture in 2008
- SID degree programme curriculum
- Formal, comprehensive self-evaluation reports on the degree programme written in 2010 and 2011
- Student feedback for all study units and students' answers of the initial stage feedback questionnaires
- Self-evaluation reports written by lecturers for each study unit
- Memos of the SID Advisory Board meetings in 2009-2011
- External evaluation (Konttinen et al., 2012)
- Other documents for developing the SID degree programme (e.g. Multiform thesis guidelines, Competence development plan, Master's thesis evaluation criteria)
- Statistics and other documents of Laurea University of Applied Sciences (e.g. strategies, quality system)

FINDINGS

In this section, the design, implementation and assessment of the Master's degree programme in Service Innovation and Design are analysed.

Setting the objectives and designing the curriculum

In Finland, the Ministry of Education and Culture reviews plans for new master's degree programs in universities of applied sciences and makes the decision whether or not the universities are given the permission and financing to provide such education. The Ministry of Education and Culture has also set the national minimum requirements for students applying to a master's degree program provided by a university of applied sciences. The applicants must have a completed bachelor degree and at least three years of relevant working experiences after their graduation. Thus, the students of the master's degree programs are already professionals themselves in their field. The studies, which can be completed along-side a full-time job, are meant to strengthen their professional competences as well as to boost their own organizations.

The strategic intent of Laurea University of Applied Sciences was the first impulse for a totally new degree programme. The renewed strategy focused on service innovations and internalisation, and highlighted the status of master level degrees. In the beginning of the development process, the main objective was to create a plan for education which is truly based on genuine competence development needs of companies and other organizations, particularly in the Helsinki capital region where the case university is located. In particular, the main target group of the new programme was international professionals working in the Helsinki capital region. It was stressed that every aspect of the plan for the new degree programme is carefully and reliably studied and motivated. Motivating the real need for this kind of education was based on own research and on various national and international government and industry reports, studies and statistics dealing with competence needs now and in the future. Moreover, the plan was based on discussions and interviews with service design professionals and academics in several organizations. A broad report on the significance of service innovation and design competence in international and domestic operating environments was drawn up as a basis for preparing the application.

As a result of a lengthy development process, Laurea submitted the application for the Master's degree programme in Service Innovation and Design (Master of Business Administration) to the Ministry of Education and Culture at the beginning of 2008. The plan of the new Master's degree programme was accepted in spring 2008, and public financing for the education was confirmed so that first students could enroll on the programme in fall 2009.

After receiving approval from the Ministry of Education and Culture to launch the new Master's degree programme, the curriculum underwent further development based e.g. on various research reports and other written material. Lecturers have had a crucial role in designing the new degree programme from the start. Four lecturers, which had a strong back ground in service research, established a service design team in the beginning of 2007, which kick-started the design process. This service design team began to actively develop competence in the field through, for example, taking part in international conferences focusing on service design competences. At the end of the design process, the SID curriculum was processed at the Service Design Network conference in Amsterdam in November 2008, where Laurea's lecturers held a workshop focusing on the SID curriculum. The curriculum was developed further with international experts in January 2009, when Laurea arranged the second international Service Innovation & Design seminar in its campus. Moreover, the SID Advisory Board commented on the SID curriculum. After the launch of the degree programme in 2009, updating the competences needs has continued intensively until the present day.

Based on the extensive research and discussions, a framework of SID competences was developed. Afterwards, these competence areas were divided into study themes consisting of more specific study units (each 5 ects credits). In other words, the SID curriculum is constructed from themes and study units, which are derived from competences in the SID field. The themes are:

- Business and Management Competences in Service Innovation (15 ects credits + elective studies)
- Value Creating Competences (15 ects credits + elective studies)
- User-centric Service Design Competences (15 ects credits + elective studies)
- Master's thesis: Service Development Project (30 ects credits)

The SID competence level definition is established on the learning outcomes relevant to Level 7 in the European Qualifications Framework for Lifelong Learning (EQF 2008):

- Knowledge
  - highly specialized knowledge, some of which is at the forefront of knowledge in a field of service innovation and design, as the basis for original thinking and research
  - critical awareness of knowledge issues in SID and at the interface between different fields
- Skills
  - specialized problem-solving skills required in research and innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
- Competence
  - manage and transform contexts that are complex, unpredictable and require new strategic approaches
  - take responsibility for contributing to professional knowledge and practice and for reviewing the strategic performance of teams

There has been a strong involvement of different stakeholders in the design and further development of the SID curriculum. In summer 2007, Laurea University of Applied Sciences was accepted into the international Service Design Network (SDN), which, through collaboration based on multidisciplinary competence, aims to profitably address the needs relating to both practically and scientifically developing the service design competence area. Today, almost 200 companies and higher education institutions from around the world belong to the network. The SID team members have participated in all annual SDN conferences which have provided a good opportunity to discuss the degree programme with other service design educators and experts. In January 2008, Laurea University of Applied Sciences was a founding member of another international service design and innovation network. Originally, this service design network aimed at bringing together Nordic higher education and research institutions within the competence area. Currently, this network has extended to other parts of Europe, such as UK and Italy. The network has agreed to arrange a Service Design and Innovation research conference: the first ServDes conference was held in Oslo in 2009 and the second in Linköping in 2010. The third conference was arranged at Laurea in February 2012. This ServDes.2012 Conference is part of the Helsinki World Design Capital 2012 programme. The SID lecturers were in the key role of organising the conference, and SID students submitted papers/workshop ideas for the conference. They all also had a poster presentation there. The curricula of different universities providing service design education were discussed in a workshop in the conference. Moreover, four international Service Innovation and Design seminars have been held at Laurea (2007, 2009, 2010, and 2011). Laurea's SID lecturers have initiated and organised the seminars, and invited several leading international experts from business and academia to give a keynote presentation or lead a workshop for each of the four seminars. All these events and networks have strongly facilitated the following of the contemporary international discussion in the competence field.

The SID Master's programme has impressive knowledge in its Advisory Board not only by academic standards but also in terms of business competence and experience. The Advisory Board consists of ten highly experienced business executives, entrepreneurs and academics in the field of SID. SID Advisory Board was assembled six months before the first SID students began their studies. SID Advisory Board has convened four

times in each year: 2009, 2010 and 2011. In its meetings of several hours, the Advisory Board has applied diverse methods for processing the needs arising from the SID competence base. In addition, the members have commented on the curriculum, participated in a development workshop organised by the SID students, worked as evaluators in the entrance examinations, and taken part in the launch of the SID, in the planning and implementation of the annual SID seminars and the ServDes conference, and in the SID teaching as visiting lecturers.

Implementing the degree programme

At the master's level, the professional expertise of students has to be taken into account and a mechanism that allows the tacit knowledge sharing has to be applied, i.e. learning from each other and creating new knowledge together. In line with innovation theories, the aim has been to reach a heterogenic group of SID students (i.e. different educational backgrounds, different employment histories and jobs, many nationalities). Heterogeneity of the students is a fruitful ground for innovation and creative thinking. That is why team bonding among the SID students has been one of the main targets when the students begin their studies. In the first orientation day, they immediately start working in small groups to get to know each other and to familiarise themselves with the active role of a student, i.e. active dialog instead of passive listening. Their first orientation task has been to prepare a creative presentation based on written material in small groups on (1) Laurea's learning philosophy, Learning by Developing, (2) Laurea's quality assurance system, (3) the Master's level competences, (4) the SID curriculum, and (5) the Master's thesis process.

Two tutor lecturers have divided the groups in half and hold one-hour individual tutoring discussions at the beginning of the studies with each student. Students have completed their personal study plan, the Competence Development Plan, as a basis for the discussions, and the plan is supplemented during the studies. In the Competence Development Plan, students set competence development targets from four different perspectives: (1) reflecting general Master's level objectives (law, EQF), (2) reflecting the subject-specific objectives of the SID curriculum, (3) other personal competence development goals, and (4) thesis learning outcomes. Subsequent tutoring discussions are held as necessary with each student.

The Service Innovation and Design programme is conducted using the Learning by Developing (LbD) approach developed and adopted by Laurea itself (Raij, 2007). Learning by Developing is the pedagogical innovation that the Finnish National Evaluation Council based their decision on when Laurea was appointed as a Centre of Excellence in Education. The LbD approach is based on the principle of involving students in diverse and demanding research and development projects, carried out in cooperation with companies and other organisations (Raij, 2007). For example, the SID Master's students have been working for a long-term project (2010-2012) called CoCo that aims to enhance co-creation in the b-to-b context and to create concrete tools and methods for involving customers in the processes of both designing and delivering services. The CoCo project is carried out in conjunction with four b-to-b service companies, Laurea, VTT Technical Research Centre of Finland and Tekes (The Finnish Funding Agency for Technology and Innovation). The students have analysed the current state of the co-creation approach in the companies, and now they are starting to organise workshops in the companies where they will utilise different service design methods. Under the guidance of lecturers and experts from business and other organisations, students receive genuine, research-oriented and multidisciplinary learning that is completely different from memorising facts by heart for exams. In other words, a great deal of learning is based on practical problem solving in authentic cases, either in larger projects such as CoCo or in the students' own organisations. This greatly motivates students, since they are able to directly contribute to their own work and the development of their organisations. Consequently, the role of teacher changes from traditional lecturer into that of coach.

Typically, two lecturers are in charge of a study unit. Also, theses supervisors work in pairs since it is important to get more viewpoints in every development project. The studies include an average of three days of intensive contact sessions, i.e. face-to-face instruction, once a month (one Thursday-Friday-Saturday, at 9 am - 5 pm

each day). One of the five-credit study units involves three full days of face-to-face contact sessions usually arranged one month apart. It has been important to agree the intensive contact days for the whole calendar year at least six months ahead. During the contact sessions, students take part into workshops, group discussions, assignment presentations, or any other interactive events, which allow personal knowledge sharing. Also more traditional teaching methods such as lectures are in use, though these events are tried to keep in minimum, and if held, external speakers from companies are often invited to lecture (business case stories). The students complete various assignments between the contact sessions. The assignments are completed in a larger RDI project or related to students' own organisations in order to involve them, and transfer and disseminate new knowledge in the organizations. The assignments include for example customer research, blueprinting of service processes, designing scenarios for new service concepts, or some accounting tasks.

Competence evaluation is based on the objectives described in the curriculum. Overall evaluation criteria (based on EQF level 7) have been produced as a tool for study unit evaluation. Evaluation has mainly focused on assignment results, learning diaries, active participation or similar. Exams have not been arranged; theory has been studied through application within practical assignments.

Assessing and further development of the curriculum and the implementation

Regular SID lecturer meetings and SID Advisory Board meetings are the two main forums for the quality and effectiveness monitoring and related developing. In connection to lecturer meetings, student feedback and development proposals from different sources are discussed and the necessary rectifications made. Moreover, the degree programme has taken part in formal external evaluation processes (see e.g. Konttinen et al., 2012). The strategy implementation plan of Laurea University of Applied Sciences describes the key indicators, which are used for measuring the impact of the degree programme. Continuously monitored indicators include:

- Study progress, student-specific number of credits (accumulation of studies)
- Level of student feedback (quantitative and qualitative)
- Participation of students in face-to-face contact sessions and workshops
- Participation of students in Laurea's RDI projects
- Number (i.e. the appeal rate) and backgrounds of applicants

The SID degree programme complies with Laurea's quality system. Student feedback is gathered from each study unit. Quantitative data is displayed for students on a virtual platform. The lecturers have also access to all open comments. Study unit feedback is discussed at the lecturer meetings. Based on the feedback and personal experiences, lecturers draw up a self-evaluation on the study unit, which is saved for public view. In addition to the study unit feedback, initial stage feedback is gathered from students after their first six months of studying in the degree programme. This feedback is also visible for students on the virtual platform and discussed at the lecturer meeting. Graduation stage feedback is collected subsequently. The Student Affairs Office submits reports to the head of the degree programme before each lecturer meeting, which allow monitoring study progress on student level. The prerequisites for studying are constantly monitored.

The appeal rate has been very high compared to the other Master's degree programmes in the Finnish Universities of Applied Sciences. In the first application period in 2009, the number of 1st place applicants totalled 8.8 the number of selected applicants. In the second application period, the appeal rate for all 1st place applicants was 8.84.

In addition to the formal feedback questionnaires, the voice of students has been heard through tutoring discussions, discussions in connection to teaching, and informal feedback received via email. There is also a student representative in the SID Advisory Board. Student feedback of different types has influenced further degree programme planning. For example, based on informal feedback discussions with the students in spring 2011, a totally new elective study unit "Tools for visual communication in service design" (5 ects credits) was

designed and immediately implemented in autumn 2011. The SID students have actively given development ideas and participated in the promoting of the SID. For example, two SID students developed a marketing plan and a future vision for the programme using creative service design methods and involving the students, lecturers and the Advisory Board members.

Future competence needs are forecasted and the curriculum is constantly evaluated in the following way:

- SID Advisory Board members highlight future prospects of different sectors
- RDI project partners (companies and others) highlight future prospects of different sectors
- Reports and studies published by different operators on domestic and international forums are monitored actively
- Lecturers take actively part in different domestic and international events and networks within the SID field
- Students take part in events, seminars and conferences within the competence area, and report on these on the virtual study platform
- Students provide direct links to the development challenges of several sectors (evident e.g. in development tasks and theses)

Due to the fact that the degree programme was launched in autumn 2009, there is not yet any long-term evidence (3-5 years) of the effectiveness of teaching. Still, there are, for example, already some signs of entrepreneurship: a few SID students have started a new company as a consequence of the studies. Currently, several students are planning of starting an own company. Additionally, the SID students have created lots of innovative development ideas for various companies and other organizations in their assignments and theses.

DISCUSSION AND CONCLUSION

This article contributes to the scientific literature by increasing the knowledge of the development of higher education focusing on new kinds of innovative business competences. It shows how the need for new competences is found and analyzed and how the new degree programme is planned, implemented, assessed and continuously developed. This article increases the knowledge of the phases and activities of degree programme and curriculum development in general. Competence needs change rapidly in almost any industry. Thus, clear and updated guidelines are needed for continuous higher education development. The findings introduced in this article are based on a successful practical case. This study has clear potential to function as a general guideline for the development of a new degree programme, although case specific adjustment is always required.

The presented case started with setting the objectives for the development process. This is well in line with the earlier literature describing the development of curricula and degree programmes (e.g. Ornstein & Hunkins, 1998; Phillips, Settoon, and Phillips, 2008). The literature tends to emphasize how faculty, students, and employers affect the objectives of degree programme being developed. Still, in many countries, particularly in Northern Europe, the education leading to a university degree is typically publicly financed and regulated. For example, in the present case, the studies in the degree programme are almost free to the students, and the government and the municipalities pay practically all the costs of the education. Then, naturally, the first objectives for the education come from the authorities of the educational system, in this case from the Finnish Ministry of Education and Culture. The present study suggests that, when the studies in a university are publicly financed, then the very first step of the development process of the degree programme is to carefully analyse and fully understand the objectives and philosophy of the relevant authorities in the educational system related to the type of education being developed. Moreover, when setting the objectives for the development process, the strategic intents of the university need to be taken into account, and it also is important the top management of the university fully supports the development process. This guarantees adequate resources to the development team.

Higher education development projects may sometimes be subject to various contradictory interests of difference stakeholders (c.f. Phillips, Settoon & Phillips, 2008). There is a danger that some influences may be more influential than the others if a faculty member works alone in planning compared to a process in which a group of colleagues plan an entire programme (e.g. Stark, 2000). The findings of this study suggest that clear objectives and a concrete project with an assigned person in charge tend to ease the balance of different needs and desires of diverse stakeholders. Even though the design and implementation processes have been strongly led by one person in the present case, the processes have been truly collaborative involving a large number of stakeholders. This study also reveals that analytical planning work with accurate and grounded argumentation, which to a large extent resembles scientific research, is crucial in order to make the plan reliable in the eyes of reviewers and other stakeholders. Later, this kind of a profound analysis of competence needs and planning of the programme based on the analysis tends to generate students who graduate more prepared to assume positions being demanded by employers.

When the objectives and the project team were set, the design of the SID curriculum started. The curriculum has been derived from the identified competence needs of businesses. The aim of the SID programme is to provide students with multidisciplinary knowledge in service innovation and design. This happens through advanced studies of different service theories and their implications for SID practice. The programme brings students to the forefront of recent developments in the SID field by including supervised development training. Another important objective is to improve students' competences in combining academic rigour with managerial relevance when working on independent projects. A central theme of the studies is that service business requires a distinctive approach to strategy, innovation and design. At the beginning of the studies, students acquire the competences related to deeply understanding customers/users, their latent needs and behaviours in their natural environment. At the same time, they study strategic management and new service development. They also familiarise themselves with the basics of design thinking. In the second semester, they learn methodologies for futures studies and deepen their competences in service design processes and methods. Moreover, they learn how to build a service brand, and to commercialise and sell services. Finally, service leadership and service culture is their last compulsory topic. The elective studies (15 ects credits) enable students to pursue their specific interests, as well as to overcome deficiencies in their service design skills. For example, service design tools, cross-cultural issues and management of business networks are topics that the student may choose. The SID studies culminate in a Master's thesis project. The aim of the Master's thesis is to develop the student's ability to carry out a demanding service development project independently.

The next main phase of the development process of a master's degree programme is implementing. This study extends knowledge by finding the relevant elements of successful implementation in the new master's degree programme. In the SID programme, the Learning by Developing approach (see Raij, 2007) is used. Learning in authentic business development projects requires an active approach, commitment, a combination of theory and practice, collaboration, the sharing of expertise in teams, problem-solving skills and reflection. During the projects, students learn about things in the authentic contexts in which the knowledge will later be used. In the projects, students have the opportunity to work on long processes, in which it is essential to understand things holistically, identify and solve problems. In addition to business projects, the SID students have had important roles together with the SID Advisory Board members in the arrangements for the annual SID seminars at Laurea, for example in the planning of workshop sessions held, wrapping up the workshops, and moderating the seminar.

The students of the SID programme have a varying and multidisciplinary background. This is a significant strength of the programme. Most of the students have their educational background (i.e. a Bachelor's or a Master's degree) either in the field of business administration, information technology, engineering or design. The group is international: almost all the continents are represented. The students work for many kinds of companies and organisations alongside their studies: multi-national corporations (both manufacturing and

pure services), SMEs and public sector. This all creates a unique and fruitful basis for innovative thinking. The heterogeneous group spends three days per month together and co-creates new competences by discussing, sharing and further developing the individual assignments they have carried out between the contact sessions. The social networks created during studies are essential from the point of view of creating new entrepreneurship: while working in these networks, students identify new opportunities and the threshold for starting out as entrepreneurs is lowered. A few new companies have already started by the SID students though the programme has been running only for about two years.

The relevance of the SID degree programme content is evaluated continuously in relation to latest research in the field and discussions within different domestic and international networks. For example, the members of the SID Advisory Board bring state-of-the-art knowledge of the contemporary issues and trends in SID in the business community. They also offer their personal network for the use of the programme.

In sum, the profound analysis of the case material and the participant observations during the action research show that the main issues related to the success of a new Master's degree programme tend to be (1) clear objectives, (2) extensive research on future competence needs, (3) a committed and strongly led development team, (4) comprehensive networks with the key players in the competence area, and (5) a thorough documentation of the whole process as a basis for continuous development.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 15 ISSN 1309-6249

THE PREPARATION FOR SELF-EMPLOYMENT – EXPERIENCES OF POLISH VOCATIONAL SCHOOLS "STUDY REPORT"

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ABSTRACT

We are currently witnessing the return to self-employment. The development of individual entrepreneurship is, among others, the result of transition to services and changes in the character and organization of work. This paper underscores the fact that the Polish vocational education system spares no efforts on adaptation to the existing conditions so that vocational school graduates could have better prospects for employment. Hence, transformations in the field of vocational education were also to be made in accordance with the following principle – vocational mobility, understood as the ability to look for employment not only in other companies, but also try to be self-employed.

The problem of sole proprietorship has been analysed on basis of the results comprised in the following study: *„The preparation of students to flexible forms of employment and work organization"*.The study was financed with educational funds covering the years 2009 – 2010 as an academic research promoter project.

Key Words: Vocational education, labour market, self-employment.

INTRODUCTION

Polish schools tend to adopt the critical-emancipational doctrine, which is based on the assumption that education should stimulate human abilities and prepare people to rebuild the reality by, among others, developing creativity, shaping social abilities and sharing work-related and general knowledge (Bogaj, 2006). Modern approach to vocational preparation includes quitting the concept of finding one job for the whole life and treating frequent job changes as a norm. The process of externalization, which is typical for open labour markets, triggers the stimulation of vocational development in the field of the so called "general employment competences" (Bańka, 2007, 39-41). Thus, such attributes as **the ability to self-employ** and motivation to be responsible for one's own professional progress are so crucial.

When we speak about self-employment we most often describe it as an individual economic activity or sole proprietorship of a natural person. In modern companies' practice self-employment also means establishing task-based staff teams, which work on their own financial account. It is a frequent way of making the EU labour market more flexible. However, when it comes to the evaluation of economic activities, we can distinguish the following: people in danger of losing their job who start a company in order to secure the *substitution of income*; company owners who deliberately quit their previous jobs in order to be able to act more freely, and owners of *companies* that aim for continuous development and cover their own economic entity (Lipski, 2003).

Unfortunately, in Polish conditions self-employment is still treated mainly as a way of defence against social and financial degradation. It does not go in pair with a well-considered and continuous strategy of employment that can allow the realization of life ambitions and guarantee a high level of professional satisfaction. The majority of self-employed people (including young people) consider such a solution a temporary situation and they see themselves rather as temporary contractors, employers or cooperatives. Thus, the following question arise: *Why do young people decide for self-employment so rarely these days? What sort of actions should be taken in order to popularize self-employment? What do vocational schools do in this matter and what can they do?* The following text attempts to answer these questions.

METHOD

The purpose of the study was to determine the situation of vocational school students' preparation to flexible forms of employment (including self-employment) and work organization, recognize the conditionings of that situation and determine the relevance of the abovementioned preparation in terms of employment possibilities. It was also about indicating specific actions that should be taken in order to prepare young people to active functioning in the modern and flexible labour market. 630 students and 122 teachers (from basic vocational schools, secondary vocational schools and post-secondary schools) plus 20 labour market institutions and 74 companies have been surveyed. The results of the study have been acquired through the poll method and the techniques of a survey questionnaire and an interview – prepared for the sole purpose of the study.

Among surveyed respondents, last year students, there were mainly students representing secondary level of education – namely, a secondary vocational school (52.5% of all respondents). Students of basic vocational schools constituted 28.1% of the surveyed group while students of post-secondary schools were as many as 11.3%. The least numerous group (8.1%) comprised students of supplementary secondary vocational schools. Among all professions that the surveyed basic vocational school students were trained in, the professions of industrial workers and craftsmen were the most frequent. The most typical specialisations among vocational school students comprised the preparation for the so called middle technical staff (e.g. IT specialists and electronic equipment operators). In case of post-secondary schools, economic and administrational specialisations were the most popular. Surveyed students were mostly city residents with only 24.3% of students coming from the countryside.

The present article focuses most of all on the position of vocational school students in terms of starting and running their own business. The paper demonstrates different opinions of surveyed participants regarding advantages and disadvantages of self-employment and the corresponding vocational preparation. The analysis of the problem has been accrued by the opinions of teachers from surveyed schools (teachers of general and work-related subjects and vocational practice instructors), entrepreneurs, representatives of labour market institutions and organizations supporting young people in preparation to employment.

FINDINGS

1. The Interest In Running An Own Business Among Vocational School Students

A number of respondents (18.6%) definitely refused the possibility of self-employment with the following opinions prevailing: *"I will not be able to obtain adequate funds for my own business", "it's easier to work for someone else"* (*"the responsibility isn't that high when you work in a public workplace", "you don't have to search for suitable employees"*), *"I am not fitted for running a business".* On the other hand, 42.0% of surveyed students did not exclude the possibility of taking advantage of self-employment in the future. They justified their present hesitation by admitting that running a company is a time-consuming, responsible and risky task – both from the financial point of view and because of high competition in the modern labour market. A group which was most interested in self-employment in the future comprised secondary vocational school students.

Whereas, a similarly high hesitation, when it comes to running a business, has been observed among basic vocational school students (41.8%) and post-secondary school students (45.1%).

Chart I: Surveyed students on their willingness to take advantage of self-employment in the future – detailed justification

Students' answers	Number	%
I would like to organize my work myself	83	13.2
An own company means higher income	47	7.5
I will have better opportunities to make my professional dreams come true	46	7.3
An own company means workplaces for others	11	1.7
Other	15	2.4
Total "yes"	**202**	**32.1**
I don't have a conception for my future work yet	85	13.5
Running an own company is a responsible and risky task	39	6.2
At the beginning I would prefer to hold a regular post	14	2.2
Other	9	1.4
Total "hard to say"	**147**	**23.3**
I will not be able to obtain adequate funds for my own business	21	3.3
It's easier to work for someone else	28	4.4
I am not fitted for running an own business	8	1.3
Other	5	0.8
Total "no"	**62**	**9.8**

(Source: self-analysis)

Only 7.3% of all respondents (Diagram I) have had experience with self-employment. It was often an activity held via the Internet or the surveyed respondents offered simple service (e.g. cleaning). Among them, post-secondary school students slightly prevailed. When it comes to flexible forms of employment, the following ones were definitely most popular among vocational school students: commission contracts (used by 28.7% of respondents), contracts for a definite time (24.6%) and temporary work (acquired via temporary work agencies) applied by 17.5% of surveyed participants.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 15 ISSN 1309-6249

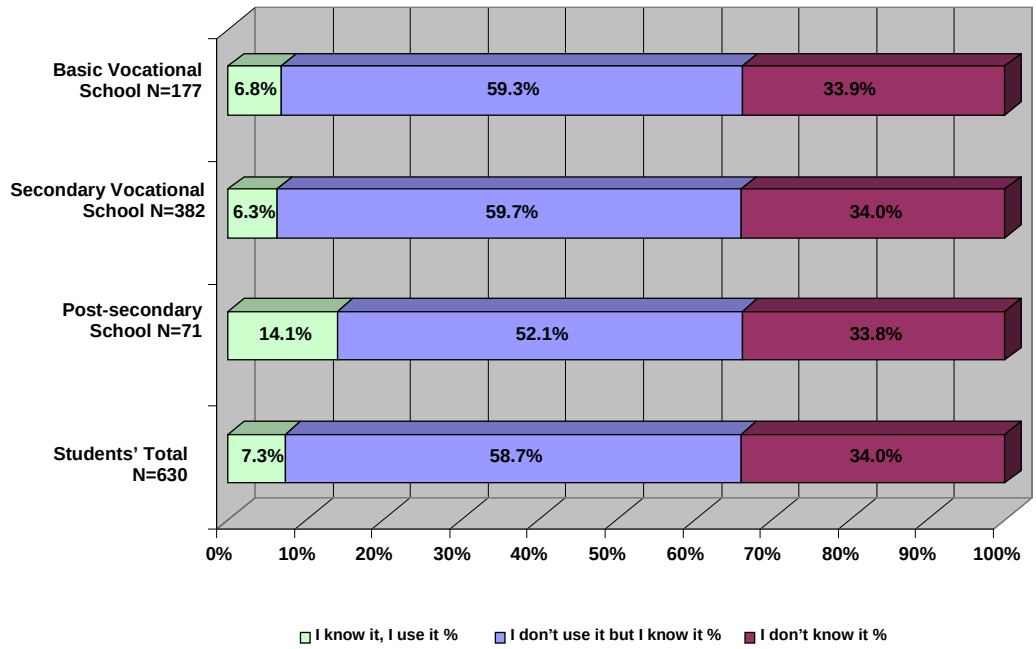

Diagram I: Self-employment as a flexible form of employment which is familiar to and applied among surveyed students
(Source: self-analysis)

Over a half of surveyed students agreed with the existence of the presented advantages related to starting an own business. What is interesting, the attributes of self-employment were also noticed by people, who had earlier declared that they did not want to run their own business. The results of the study also show that the following advantages of self-employment were indicated most frequently: *higher independence* (90.3%) and *better flexibility in terms of time, place and work organization* (according to 76.7% of the respondents). The abovementioned choices are fully consistent with the previous statements of young people listed in Chart I – "I would like to organize my work myself" or "I will have better opportunities to make my professional dreams come true". The only surprising result was *security of employment* (69.5%). This advantage was presumably identified with the fact that a person cannot be dismissed by one's boss, who in self-employment apparently does not exist.

Chart II: Advantages of self-employment according to surveyed students

No.	Advantages of self-employment	N=630		Rating
		Number	%	
1.	**Higher independence**	**569**	**90.3**	**I**
2.	More favourable possibilities of settling tax deductible expenses	297	47.1	VII
3.	Receiving work from several companies at once	356	56.5	V

4.	**Better flexibility in terms of time, place and work organization**	**483**	**76.7**	**II**
5.	**Security of employment**	**438**	**69.5**	**III**
6.	Higher work efficiency and higher income	403	64.0	IV
7.	Opportunity to work in different EU countries	341	54.1	VI
8.	Other	7	1.1	-
9.	No advantages	3	0.5	-

(Source: self-analysis)

Why, despite many observable advantages, do young Poles decide for self-employment so rarely? This question has been answered not only by students but also by teachers from vocational schools, workers of labour market institutions and representatives of employing entities. The task for the first two groups was to arrange given answers within a specific range (from 1 – the most important reason to 8 – the least important). Thus, respondents indicated *lack of funds* as the most significant justification of the situation why young people do not decide for self-employment (1st place in both students' and teachers' ratings). Students also indicated to the lack of abilities needed to run their own company and their unreadiness to take a risk. The abovementioned choices are fully consistent with the previous opinions of the youth regarding self-employment. Unfortunately, they also reveal "gaps" in the process of preparing vocational school students for the start of their own business. What is surprising, teachers confirmed it as well – *young people lack suitable content-related preparation* (3rd place in respondents' rating). The remaining results, divided into groups of surveyed respondents, have been presented in Chart III.

Chart III: The reasons why young people do not decide for self-employment according to surveyed students and teachers

No.	Reasons for the lack of decision	Students N=630(408*)		Teachers N=122(55*)		Total average of the choice	Choice rating
		$\bar{X}$	Rs	$\bar{X}$	Rt		
1.	**They do not have sufficient funds**	**2.80**	**I**	**3.44**	**I**	**3.12**	**I**
2.	They lack suitable content-related preparation	4.74	V	4.20	III	4.47	V
3.	**They lack abilities essential for running an own business**	**4.05**	**II**	**4.42**	**IV**	**4.24**	**III**
4.	**They are afraid of bureaucracy and complicated law regulations**	**4.25**	**IV**	**3.73**	**II**	**3.99**	**II**
5.	They lack information about duties that	5.17	VI	5.25	VI	5.21	VI

	accompany self-employment						
6.	They are not ready to take a risk, e.g. financial risk	4.07	**III**	4.45	V	4.26	IV
7.	They do not have a conception for their own business	5.48	VIII	5.25	VI	5.37	VIII
8.	They are afraid of the difficult market and high competition	5.33	VII	5.25	VI	5.29	VII

(Source: self-analysis)
Explanation: Rs – rating among students, Rt – rating among teachers

*Passing a question over or mistakes made by surveyed participants when arranging given reasons in order have resulted in the necessity to exclude the answers of 222 students and 67 teachers from the statistical analysis. Thus, population numbers are lower.

Workers of labour market institutions presented opinions similar to students' opinions. They claimed that, above all, it is difficult for vocational school students to specify their own knowledge and abilities. They are also not properly motivated and unsupported in building self-confidence. However, the most important reason for the lack of decision to undertake self-employment, indicated by representatives of surveyed institutions (when interviewed), *was anxiety among young people about bureaucracy and complicated law regulations* – according to 16 surveyed respondents (N=30). Many respondents also underscored the fact that not every person is fitted for self-employment. From the other hand, a representative of the Association of Employers and Entrepreneurs has admitted that "young people in Poland do not decide for self-employment because, in most cases, they do not have family traditions in this matter and they are not able to draw information from specific examples – i.e. running an own business". According to him, the better educated a person is, the more he/she fears of starting and running a business as he/she is aware of dangers connected with having an own business. That is why it is necessary to show young people the so called good examples and organize meetings with successful entrepreneurs. It is necessary to teach young people to take advantage of others' experience.

2. The Preparation Of Students To Self-Employment At Vocational Schools

The analysis of the results has confirmed the earlier hypothesis saying **that vocational schools prepare their students to self-employment mainly within the "business basics" subject**. However, they also try to undertake different initiatives outside the scope of traditional education (Chart IV). Although these are not very innovative solutions, they are certainly indispensable – i.e. meetings with local employers and self-employed people, explaining the activity of Business Incubators or the County Labour Office supporting people who want to start their own business. Among surveyed schools there were also such undertakings as encouraging students to take part in interscholar competitions and the Entrepreneurship Olympiad, and also programmes held by extra-scholar entities: "Zarządzanie Firmą" (Managing a Company), "Przedsiębiorcza młodzież" (Venturesome Youth), "Zarządzanie Finansami" (Financial Management) and the Global Entrepreneurship Week. Whereas, only in three schools (N=7) students managed didactic companies, and in two schools simple but effective ways of teaching entrepreneurship were applied – students ran a school shop and published a newspaper.

A very important function in the process of preparation to flexible forms of employment, including self-employment, was fulfilled by "business basics" teachers. The undertakings carried out at surveyed schools were based on their activeness and creativity. Apart from that, they were people who had run their own businesses in the past or had been professionally connected with institutions which supported individual entrepreneurs. Despite reservations (e.g. limited possibilities of taking advantage of technical media necessary

to transfer knowledge, or unsatisfactory motivation to undertake creative tasks), vocational school students rated the work of "business basics" teachers positively. When it comes to preparation to flexible forms of employment and work organization, the expectations of respondents in the scope of the studied matter were fulfilled mainly by "business basics" lessons (86.5% of surveyed participants, including 37.9% of respondents, answered "definitely good"). Students were also very happy about other forms of activities that their schools have carried out: i.e. cooperation with workplaces offering education in conditions similar to the requirements of the labour market (67.7%) and projects that teach entrepreneurship through active tasks – 62.2% of surveyed respondents. However, the offer presented by companies often satisfied students' expectations only partially (37.6% of surveyed people) as well as the abovementioned projects (44.9% of respondents).

Chart IV: Scholar activities held beyond traditional entrepreneurship education – examples

Surveyed schools	Activities held beyond traditional entrepreneurship education
Example 1	**- There is a *School Brokerage Office*; students play the stock market (simulation game) and they are helped out by a professional broker;** **- There is a *School Career Centre* – created with the initiative of a "business basics" teacher and a school counselor;** **- The students have the opportunity to participate in the *Investment Game* – they get acquainted with the dictionary of a young investor and issues such as: "Savings and investments", "Being cautions when taking out loans";** **- In order to prepare students for making proper choices of profession and educational specialisation, the *Student's Career Card* has been introduced. It allows tracking the cooperation between students and vocational guidance consultants.**
Example 2	- *Information and Career Planning Centre* has been created. Its function is to inform students about the labour market, professions and specialisations in vocational education; **- Cooperation with *AgroNews editorial office* has been established. The editorial office provides interested students with current economic information, which is very helpful in running an agricultural holding or an agro-company;** **- There is *a Tax Office*, a *Labour Office* and an *Association of Young Economists*;** **- Students manage *imaginary (didactic) companies* and they manufacture and sell real products.**

(Source: self-analysis)

Almost 1/3 of students from surveyed schools were not happy about the activity of *School Career Centres* (32.7% of surveyed participants) and the functioning of *the Interscholar System of Vocational Guidance* (30.4%), whose basic goal is to prepare students for making proper choices of profession and deciding upon the level and way of further education. It is noteworthy that the Interscholar System of Vocational Guidance has to be supported with well-organized cooperation of all teachers, parents and local environments and it should be managed by a specialist in vocational guidance. On the other hand, a School Career Centre should supply students with knowledge and abilities, which are to help them plan their professional career, in order for them

to be able to cope with labour market requirements. Among essential benefits emerging from creating a School Career Centre there are also directional activities which support self-employment.

The activity of basic vocational schools, beneficial to the development of entrepreneurship, has been rated higher by teachers rather than students (90.2 of respondents reacted positively when asked about that issue – Diagram II, Chart V). Among them there were mainly teachers of general subjects and the so called "non-subject education specialists", such as school counselors and a vocational guidance consultant.

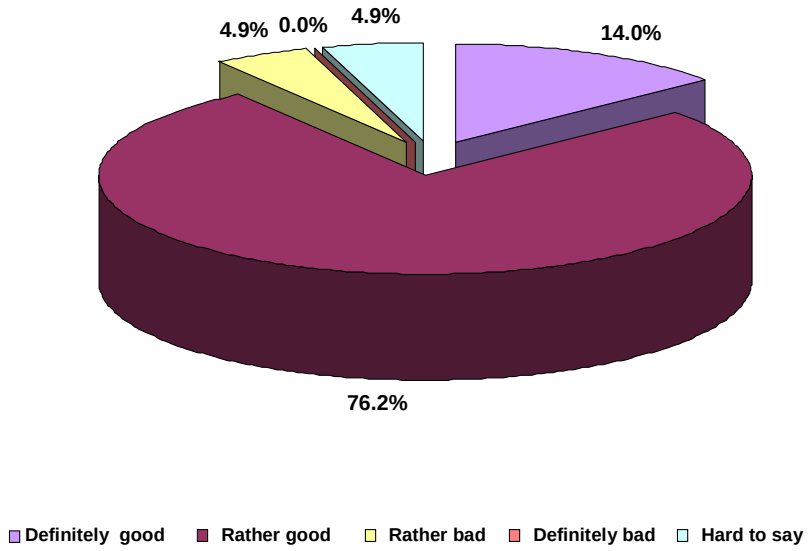

Diagram II: Teachers' evaluation of school activities in terms of providing specific conditions necessary for development of entrepreneurship among students

(Source: self-analysis)

Chart V: Evaluation of school activities made by different groups of teachers in terms of providing specific conditions necessary for development of entrepreneurship among students (in %)

No.	Opinion of surveyed participants	Sections of teachers				Total N=122
		General subjects N=28	Theoretical work-related subjects N=50	Practical vocational training N=38	Non-subject education specialists N=6	
1.	Definitely good	10.7	6.0	26.3	16.7	13.9
2.	Rather good	85.7	78.0	65.8	83.3	76.2

3.	Hard to say	-	6.0	7.9	-	4.9
4.	Rather bad	3.6	10.0	-	-	4.9
5.	Definitely bad	-	-	-	-	-

(Source: self-analysis)

Detailed evaluation made by surveyed participants does not confirm the opinion presented in subject literature saying that in the development of entrepreneurship, apart from student's development predispositions, a huge role is played by the didactic "situation" (e.g. education by performing activities, which are more process-oriented than content-oriented). According to teachers, the best incentive to take action is a positive example of active friends – i.e. showing students that self-employed people can be successful and that they can do something interesting. Respondents have also very often indicated another way of promoting activeness and entrepreneurship – the work of different special interest groups.

Surveyed teachers did not decide to evaluate their own workplace because any negative opinions would refer to their didactic activity. Whereas, both the results of the study concerning teaching "business basics" and the results of activities held beyond traditional entrepreneurship education do not entitle teachers to give such high grades. Unfortunately, on the basis of the acquired data we cannot draw an objective conclusion. This is also because only slightly more than 35.0% of surveyed teachers made an attempt to argue about conditions needed to develop entrepreneurship among vocational school students.

FINAL REFLECTION

In Poland people frequently speak about the positive influence of self-employment on the functioning of state economy. It is stressed out that the sector of small enterprises is the source of innovativeness and the trigger for macroeconomic indicators. However, only recently is has been pointed out that entrepreneurship is not limited to economic sphere only. It constitutes one of the key qualities necessary for self-realization in different spectres of life. As P. F. Drucker noticed – one can be venturesome in every situation: at school, at office, at one's own household (Drucker, 1992, 36). Moreover, entrepreneurship is connected with highly appreciated modern behaviour – taking advantage of knowledge and intellectual capital, flexible reactions to market signals, creating innovative solutions – and the question whether one is able to make use of these qualities or is not able to do that poses huge influence on the functioning of entities and organizations (Koźmiński, 2005, 163).

According to the Commission of the European Communities, education in the sphere of entrepreneurship does not only increase the probability of self-employment but also influences the development of companies due to venturesome attitude and adequate qualities of young people (the Statement of the Commission of the European Communities, 2006). The second pillar of *the European Strategy of Employment* assumes that stimulating entrepreneurship and creating new workplaces is also a method of fighting unemployment. Bearing that in mind, the governments of almost all EU countries have run special programmes whose role is to support starting an own business. Thus, among different actions which will determine Polish labour market policy (National Strategy of Employment for 2007-2013) there is support in creating new workplaces through development of entrepreneurship.

Although we know more and more about the matter of entrepreneurship and attributes of venturesome people, in Poland we still learn how to develop venturesome attitudes. Also, our Polish mentality plays a considerable role in this problem – we still have a great desire to hold a regular post – stable and safe (at least

it is seen this way). Thus, one of the surveyed employers said: *"you can distinguish two groups among young people: venturesome youth and people who do not show any initiative, malcontents aiming for a regular post – most favourably at a state office or agency".* The decision to become self-employed is determined, most of all, by specific individual qualities, including resourcefulness, persistence, self-reliance, creativity, readiness to take a risk. Most of these attributes can be discovered and developed during education at school.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 16 ISSN 1309-6249

STUDENT ADVISING & PLANNING SOFTWARE

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ABSTRACT

Student course registration is an important as well as a trivial process that may encounter unnecessary graduation delays. United Arab Emirates University *(UAEU)* is one such institution where students have faced problems depending on number of factors which may include; a lack of a proper advising system, understanding and experience of Advisers, students' ability to seek good advice, etc. Students not advised fittingly may suffer with losing time in selecting unnecessary and wrong courses. Students usually suffer with problems which may include: course selection with time conflicts, missing out on specific courses for appropriate semesters, selecting department electives bypassing track restrictions, selecting too many or less courses, etc. A Student Advising & Planning Software *(SAPS)* is devised to guide students in selecting appropriate courses suitable to register online with the University Registration System. SAPS is developed using JAVA computer programming language. The outcome of the course selection is stored (semester-wise) to show a complete typical plan. The system is under test and has been used successively on many student cases. Three typical case studies included with their course plans and analysis is reported in the paper.

Key Words: Advising, course planning, software package, JAVA.

INTRODUCTION

The purpose of the registration process at an academic institution is commonly to determine which students will be taking what courses within the university education system as well as for the administration to keep its records up-to-date. From the students' point of view, the registration process enables them to acquire the necessary authorized membership of the University and enables them to obtain their legal & authorized benefits and privileges. Typically, students register for particular courses, or modules, and this registration information is collected by members of the teaching staff and administration to construct class lists and offer other academic activities, etc.

The devised Student Advising & Planning System at the Department of Electrical Engineering, Faculty of Engineering, United Arab Emirates University, helps and guides students in selecting appropriate courses suitable to register with the online University Registration System.

Course registration is a common procedure at the University where students need to consult their Academic Advisers before the start of registration period. This consultation is however, regularly experienced with delays or a complete miss out with either Adviser too busy or student too lazy to seek advice. Although, the

registration system ascertains an academic hold on the online course selection but this hold is automatically released on the second day of registration due to some administrative preferences.

Most of these losing out students experience typical problems which may include: courses registered without completing prerequisites (this problem is almost resolved with the recent improvements to the banner system), course selection with time conflicts, missed out on specific courses which may only be offered for alternate semesters, selecting department electives bypassing track requirements and restrictions, selection of general education courses restricted for specific colleges, selecting more than one general education course from the same basket whereas only one course from each three tracks needs to be selected, selecting too many courses in a specific semester whereas this selection is based on academic warnings and low grade point averages, or too less courses which again is based on minimum credit hour *(CH)* requirements and grade point averages, etc.

Students in some of these categories suffer with problems such as, class expulsion after two or three weeks of the start because of prerequisites requirement, delayed graduation due to unnecessary additional taken courses, drop of a complete semester because of minimum number of courses requirement, etc. The SAPS is devised to counter such missing out or losing students to solve their advising and course planning problems. The advising system helps and guides students in selecting the precise and appropriate courses suitable for online registration.

The paper describes complete operation of the advising package which includes prioritized course selection, course hierarchies, graphical charts, program restrictions, filing of the complete course plan, etc. Students can run the advising program through any the department computer laboratories and create a typical course plan for the remaining semesters until graduation. The outcome is in the form of semester-wise course selection stored in a file to show a complete typical plan. Case studies of three typical students have been reported and analyzed in the paper.

The system is currently being used in the Electrical Engineering Department on a trial basis and modifications are under process to suit the department and student needs. Majority of these test trials have resulted in a success. Once the testing phase is complete, then the advising program will be investigated to be implemented in all departments of the Faculty of Engineering. Work is also in progress to convert the advising JAVA application program into a JAVA applet. This completed applet will mount on the Faculty web server for students to access the advising system online.

COURSE REGISTRATION

Before the early nineties, at most of the academic institutions throughout the world, the registration process used to involve student registrations at a single place, where most of the registration related activities were performed after the requisite form was filled and processed by the concerned department. This (centralized) single point activity used to generate many concerns for queues, fee payments, query handling, and other related issues.

In mid nineties, the majority of the well-known academic institutions throughout the world started to address this perspective of registration from many different angles including student advising, student course registration, class scheduling, administrative purposes, etc. Obviously, the objective seemed to produce a highly available application that required working in a distributed environment.

In the beginning twenties, institutions throughout the world saw a rapid expansion of tertiary education. As the twenty first century approached, this trend increased nearly doubled. This rapid expansion has an indirect effect on the institution's enrolment. The average age of prospective students has increased as well as the

number of students. As the demand is stabilized, so is a need to streamline the registration process that maximizes the allocation of course places and increases the number of registered students.

Additionally, the institutions, in general, have progressed to offer programs that are specialized as well as multidisciplinary. This variety of programs has introduced time conflicts vis-à-vis chosen courses. The required registration system(s) are to be developed to provide on-line real time registration for students and enable students to maximize their opportunities in registering courses of their own interest as well as advising students in completing their degree requirements in a best possible way.

The multidisciplinary nature of modern day universities where faculties and departments can typically number as high as 10 and 50, respectively, course registration systems need to be smart enough to comprehend multiple course selections from different faculties and departments. A decent course advising system in this regard can prevent and resolve such conflicts.

The concept of computerized registration system has been to tolerate machine and network failures. Hopes were pinned that most human errors, such as incorrectly inputting data, would be detected by the system as they occurred, but it was expected that some "off-line" data manipulation would be necessary for errors which had not been foreseen.

Therefore, the success of any attempt to computerize this activity depends on the reliability, availability and integrity of the computer systems, both software and hardware, on which the registration programs are run. Because many of the departments at any university have most likely made significant investments in computer hardware, it is logical that no specialized hardware needs to be purchased and software fault-tolerance is to be used instead. The following section looks at some of similar old and recent advising systems.

COURSE ADVISING & REGISTRATION SYSTEMS

The PACE advising system is a decision model representation for course advising based on student's need to know "what to do" and "how to do it". It consisted of profiling a student's strengths and weakness, generating a personal curriculum customized to each person's needs, and producing a schedule for the courses chosen (Gunadhi, Lim, & Yeong, 1995).

The advising software at the Electrical Engineering, Texas Tech University featured a graphical user interface, that allowed students to request only courses for which they have appropriate prerequisites, co-requisites, and standing (Hagler, 1995). Similar work has been investigated by Laghari, Memon, & Habib ur Rehman (2005) on an old and phased out curriculum.

A Student Advising Software (SAS) is developed using JAVA computer programming language. It is a manual procedure, which helps and guides students in selecting appropriate courses suitable for online registration with the Banner University Registration System (Laghari & Khuwaja, 2012). Another Student Auto Advising System is developed at the Electrical Engineering Department, UAE University. It is an automated system with limited functionality and with approximately a 20% error rate (Laghari & Khuwaja, 2012). The academics at the Florida Atlantic University developed a similar web-based advising system that supplemented the conventional advising process (Marques, Ding, & Hsu, 2001).

A Bayesian Network model for planning course registration and advising by using a data mining technique is developed to predict the sequences of courses to be registered by undergraduate students whose majors are computer science or engineering (Pumpuang, Srivihok, Praneetpolgrang, & Numprasertchai, 2008).

A SASSY advising system is developed at the Armstrong Atlantic State University. This system suggests courses for an advisee based on; frequency of the course offering, balancing the course load, shortening the path length to graduation, preference of advisee and entertaining different scenarios of course loads for the entire duration of the advisee's university life (Hashemi & Blondin, 2010).

An expert system using JESS (a JAVA based rule engine and scripting environment) is developed that allows students to seek quick responses to their queries regarding their plan of study and progress in the program (Nambiar & Dutta, 2010).

Two project management tools are designed to help the students complete their degree plan sooner. The first tool provides a visualization map of course sequences, customized for each student, making advising adjustments that will optimize the time to obtain the degree under a constrained set of resources. The second tool collects information from multiple students through several semesters and it can be used to identify bottlenecks in the curriculum (Gonzalez & Esparza, 2010).

The Arjuna distributed system was developed at The University of Newcastle upon Tyne, UK. Its design aims were to provide tools to assist in the construction of highly available, fault tolerant distributed applications using atomic actions. Shrivastava, Dixon, & Parrington (1991), have discussed the design and implementation of the registration system that successfully met their requirements (Shrivastava & Panzieri, 1988) & (Parrington et al., 1995).

Another development was completed at the Wylie College IT for software architectural development of a course registration system using the specifications created for the college requirements. The Software Architecture Document provides an architectural overview of the C-Registration System. The C-Registration System was initiated by Wylie College IT to support online course registration (Johnson, 1999), (WyIT387, V1.0, Wylie College IT., 1998), (WyIT406, V2.0, 1999), & (WyIT418, V1.0, 1999).

As from one advising and registration system to another are browsed, it has been speculated that specification document is fundamental and the key to further developing a customized university course registration. Furthermore, as programs to be offered vary from institution to institution, and at the same time, universities continuously revise their curriculum as well as program requirements in order to meet market demands, the flexibility and reliability of the registration system to accommodate such changes in the program offerings has been deemed necessary for such a system to survive and evolve.

Thus, the required development work involves customized design of a network-enabled university student registration system that is capable of handling scenarios such as add/drop requests, student advising, availability of courses per term, student's registration status, enrolment summary, reports, etc.

Furthermore, the devised advising system which is under test phase in the department has shown representational efficiency and flexibility, improved performance, and ease of software development and maintenance when compared with some of the mentioned systems.

THE SAPS PACKAGE

There are nine United Arab Emirates University Faculties, which accommodate approximately 12,279 students. The Faculty of Engineering *(FOE)* has 1854 students distributed among five departments. Students from Electrical Engineering Department (200 students) take 168 credit hours of course work to fulfill the requirements for a B.Sc. degree in either of the two tracks of: Electrical Engineering or Communications Engineering. An average course work of 15 to 18 credits comprising of 4 to 6 courses per semester and from a minimum of 11 to a maximum of 16 semesters is typical to complete their degree requirements.

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The 168 credit hours of course work is divided into;
UGRU (University General Requirements Unit) - 42 credits is based on 21 CH of university preparatory courses and the remaining of general education, culture, and society courses,
ERU (Engineering Requirements Unit) - 41 credits is based on basic level of engineering, science, and math courses common to all engineering departments,
Department Compulsory Specialization Requirements - 52 credits,
Department Elective Specialization Requirements - 12 credits,
Industrial Training - 15 credits is based on student spending a complete semesters load in an industry, and the Graduation Projects - 6 credits is distributed in the last two semesters after industrial training.

The student advising software package consists of the interface as shown in Figure 1. The package interface window is designed consisting of four sections. The top section displays the package heading with university and department names. The center section displays three text columns of course selections with the labels as *Student Courses*, *Suggested Courses*, and *Selected Courses,* respectively. A set of six buttons are accommodated on the east section of the package and these are; *Student Info., Earned Courses, Course Chart, Course Hierarchy, Hierarchies,* & *Instructions* (give instructions on how to use the SAPS package). Another set of course buttons are displayed in the bottom, which also includes *delete*, *clear*, and *save* buttons. The system is also equipped with a current semester credit points and total credit points windows.

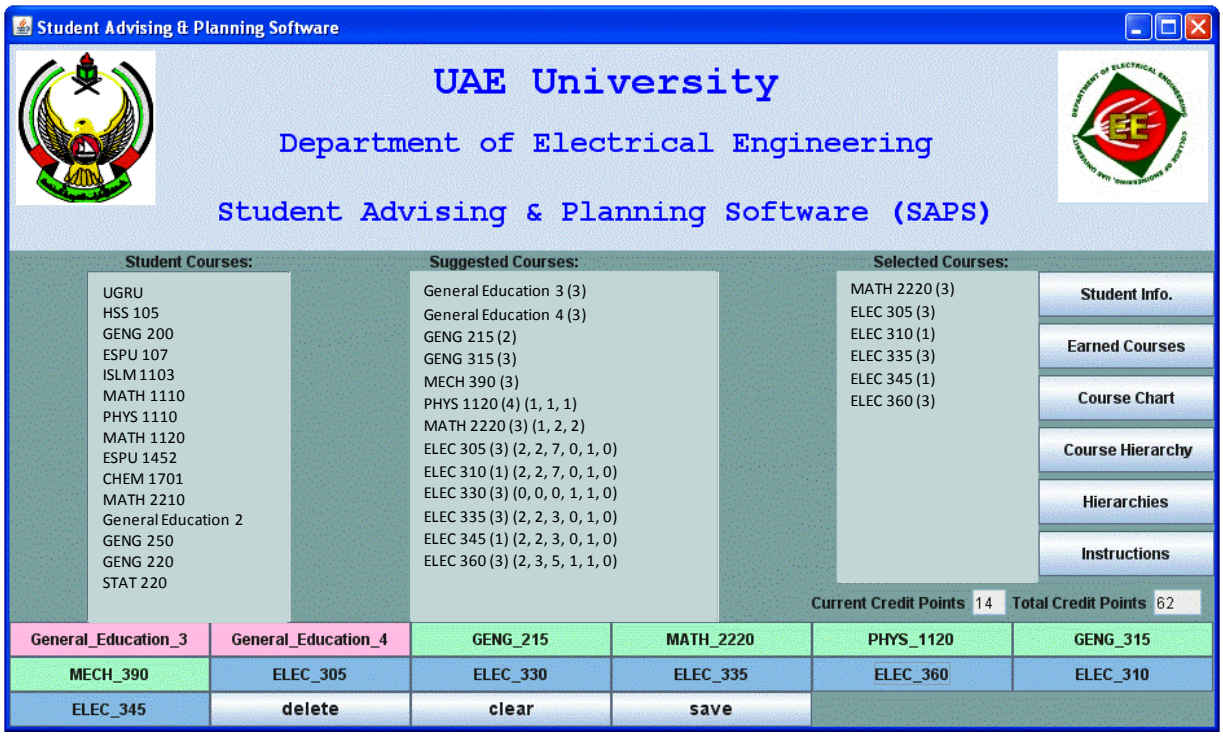

Figure 1: Interface of the SAPS package.

A typical advising session starts with the student clicking the *Student Info.(rmation)* button. This allows the user to enter information such as the student name, ID, GPA *(Grade Point Average)*, degree major, current date, and the advising start semester. *Earned Courses* button is used next to input all passed as well as currently registered courses. This information is input through another display window as shown in Figure 2.

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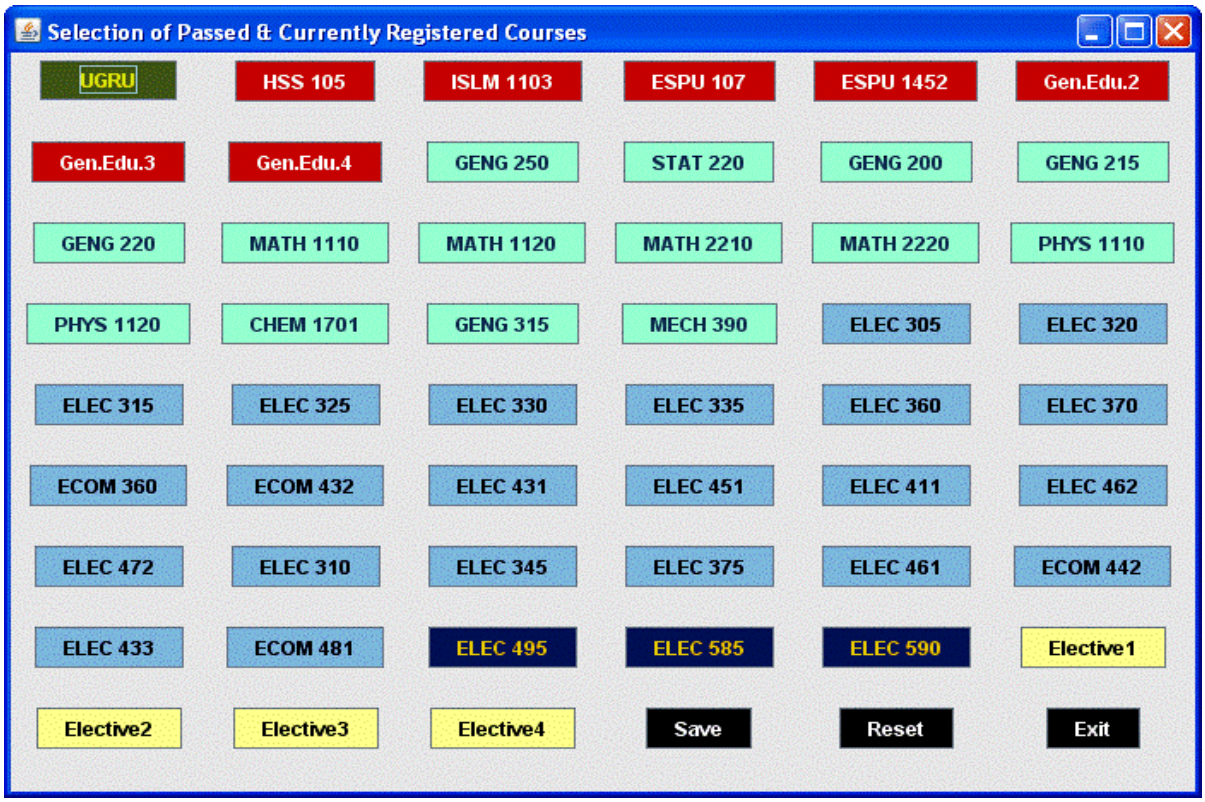
The color coding in the Figure is based on red color for university courses, green for engineering requirements, blue for department compulsory, yellow are for department electives, and the remaining for UGRU, industrial training and graduation projects. All courses Figure 2 are shown as interactive buttons. Clicking a course button makes the button disappear from the display as well as lists the course. Figure 3 shows a course list of a typical student passed and currently register courses. *Save* button is then used to save the list in a file. *Reset* button can be used to remedy for mistakes as it restarts the whole process again.

Exiting the *Passed Courses* menu inputs and prints the saved file in the *Student Courses* text area column of the SAPS package. The following section describes the package in detail in terms of the three arbitrarily picked student-advising cases. These cases were investigated in the month of January so the first advising semester is Spring of 2012.

TEST CASE # 1

A typical student case is shown with the initial courses list with 62 credit hours in the first text column of Figure 1. The student is then advised of the average credit hours/semester as well as the total number of semesters required for degree completion which is calculated by the system based on the student's entered course data. For the example from Figure 1, the remaining # of credit hours is 168 – 62 = 106. Deleting another 15 (industrial training semester) leaves 91 credit hours. With a typical student's GPA of say 3.00, an average of 15 credit hours of course work is required, and based on this average the student needs a total of seven semesters including industrial training as shown in Figure 4.



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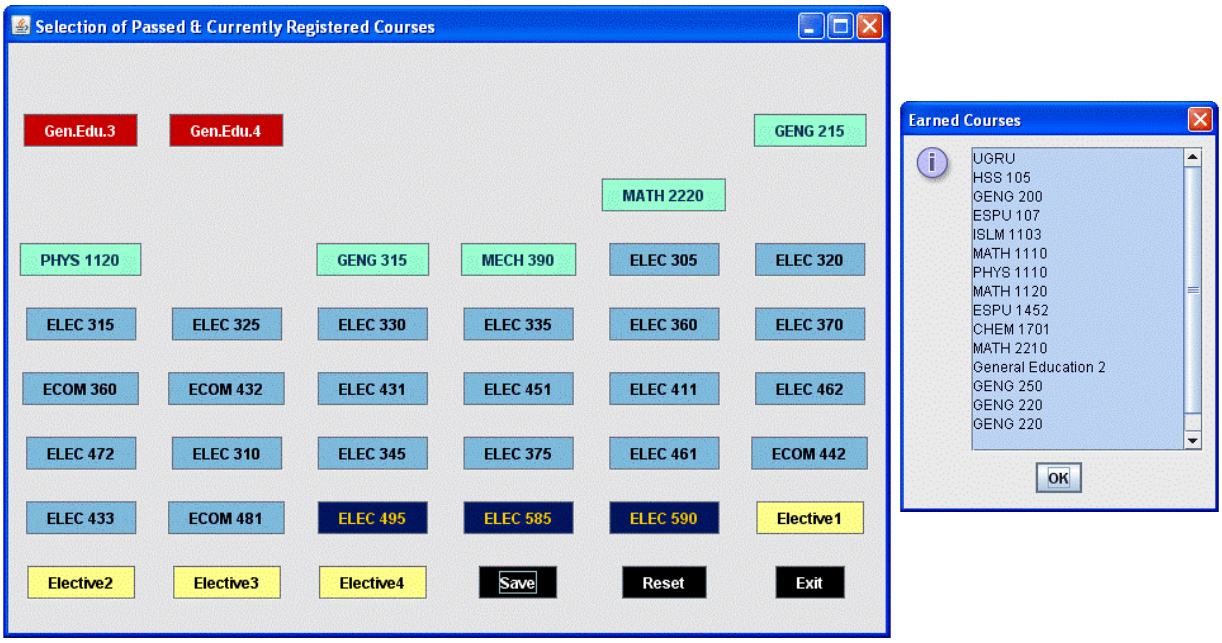

Figure 3: Selection of passed and currently registered courses.

Text column of *Suggested Courses* of Figure 1 prints all eligible courses that the student can select. This list of 13 qualified courses from a 23+ offered courses are the one whose prerequisites have already been taken by the student. Therefore, the choice for next semester courses is narrowed to a shorter list. This list is shown as interactive buttons in the bottom section of the package. Clicking a course button adds the course in the *Selected Course* text column. Any selection can be deleted as well as all selections can be cleared. The selected courses list can then be saved. This saved selection is now added to *Student Courses* column and a new set of *Suggested Courses* as well as the course buttons for the next semester (Fall 2012) are displayed. This completes one cycle of course selection and now the system is ready for the next semester courses.

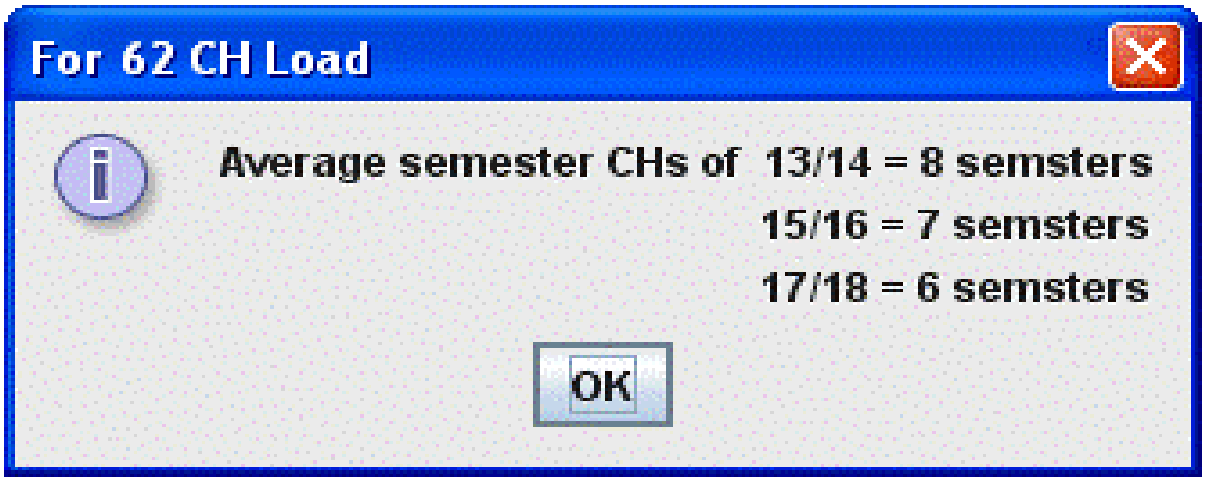

Figure 4: Average credit hours load per semester and # of semesters.

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The total number of courses offered in a specific semester is based on the syllabus as shown from Figure 5. This all courses chart can also be displayed with the *Course Chart* button from Figure 1. It is a complete course hierarchal chart showing the course separation by color coding, course hierarchies with colored arrows, courses offered in either both semesters or 1st and 2nd with appropriate numbers on top of the course, courses prerequisite for industrial training with asterisks beside the course, and 114 credit hours as a prerequisite for training. Courses such as ELEC 335 and ELEC 345 are the theory and the associated laboratory courses.

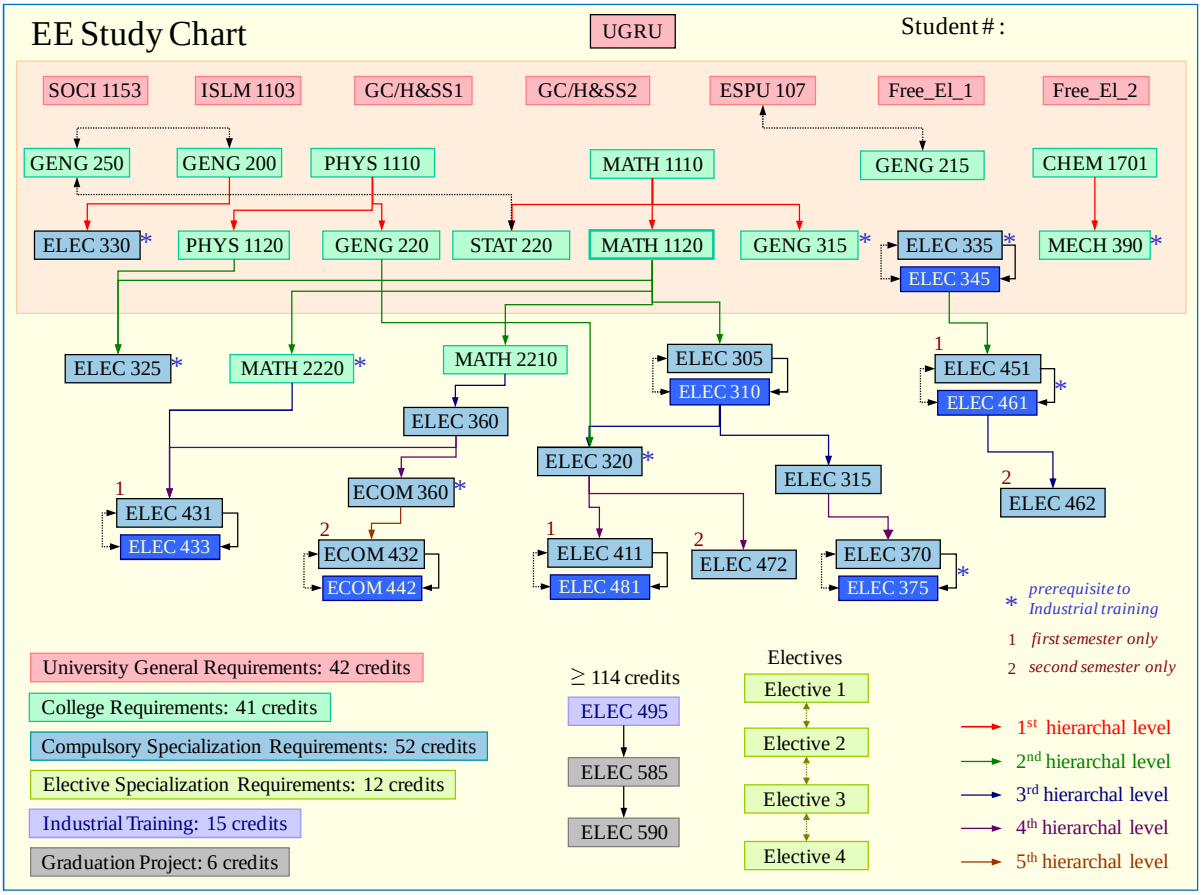

Figure 5: Course syllabus with hierarchies.

The main theme of SAPS package is the student's ability and choice of course selection. An advising student needs to beware of course priorities meaning which courses are necessary and beneficial to be taken earlier or even delayed so that he/she may not be burdened with heavy course loads as well as too slow to delay the degree completion. The next sub-section describes the knowledge area built around each course for the student to decide on selecting a specific course before a course selection procedure of a complete advising plan is shown.

Course Knowledge Area

The student's decision to choose a specific course from a pool of offered and appropriate courses is based on the knowledge area built around each course. Figure 6 shows the ELEC 360 department course with its associated knowledge area. All department courses are appended with six additional fields of:
A '2' in the first field of the example course indicates that the course has two forward hierarchical levels,

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A '3' in the second field indicates the number of opened compulsory course(s) in the next semester, which is dependent on this particular course,
A '5' in the third indicates that this course opens five compulsory courses in the following semesters,
The fourth field indicates the number of department electives dependent on this course and is shown in the Figure by the single course of 'Digital Image Processing',
A 'I' in the fifth field indicates that this course is required for industrial training or a '0' is otherwise, and
The last field indicates the offering semester; a '0' means in both semesters, a '1' for 1st, and a '2' for 2nd

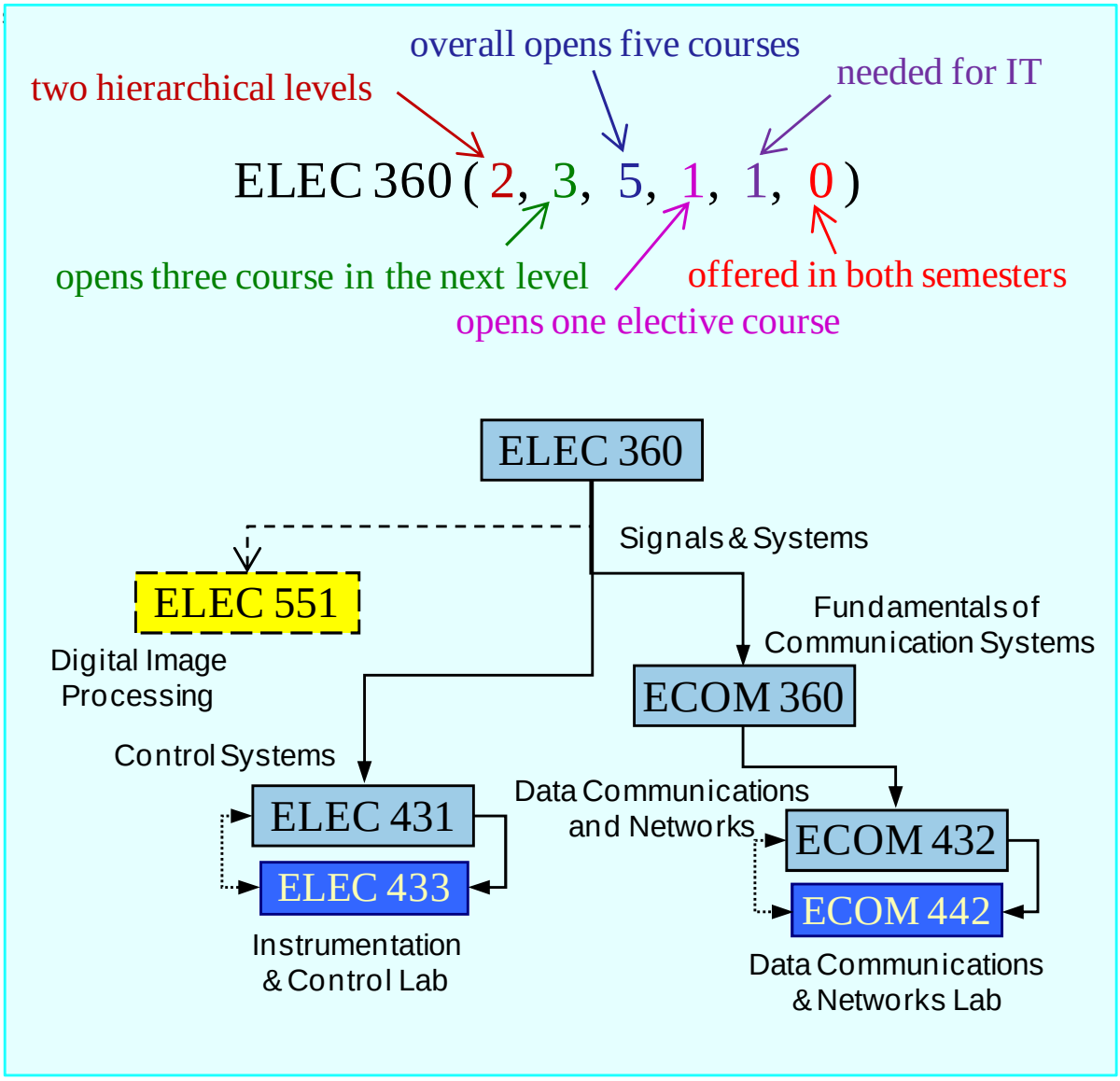

Figure 6: Course knowledge area with appended fields.

The six associated fields are prioritized in the system with the first field having the highest priority. The advising selection procedure performs a field wise comparison of all eligible courses. Courses with a higher first field value are chosen first as course hierarchal level is important. It is like a critical path and a delay in this path delays the degree completion. Figure 7 shows all courses with more than two hierarchical levels which can also be displayed by the *Hierarchies* button of the main package. If there are courses, remaining to fit in a semester

and the first field value is same for many such courses then second field is considered for selection. The second level of selection is the choice of a course opening more of the next semester courses. If still more courses are required then the third field is considered which is the total number of dependant courses.

The next three fields have like negotiable priorities. The selection decision is left on student's choice of interest and necessity. An industrial training course may be more important to take before a course for electives is chosen as electives are regularly considered after training. Alternately, it may be important to choose such a course that is offered in alternate semesters as well as opens department electives.

Some of the ERU courses are also appended with the additional first three fields. These are similar to the first three fields of department courses. All ERU courses are a prerequisite for training so the only priority is that these have to completed before training except that some are taken earlier in the course work hence the first three field priority. Courses like Physics and Math are examples.

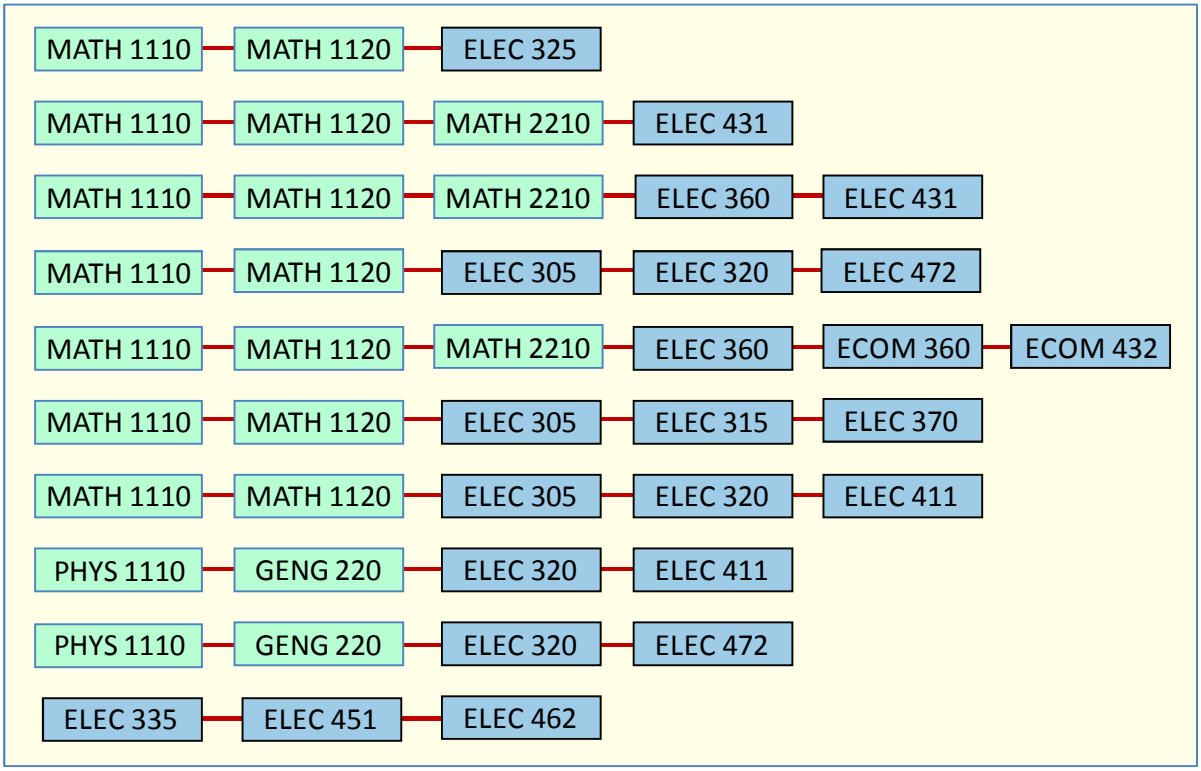

Figure 7: Course level hierarchies.

A Complete Course Plan

After the initial interface of showing student courses and suggested courses, the system is now ready for course selection mode. A student can select courses to complete a semester requirement. Subsequently, each next semester courses are displayed in the *Selected Courses* text column by clicking the save button until the last semester to complete 168 credit hours of degree requirements. All succeeding displays are saved in a file to keep a record of advising to be used later for the registration purpose. A complete course plan of the example student presenting all eligible courses and their associated selections (arrows) for seven semesters is shown in Figure 8.

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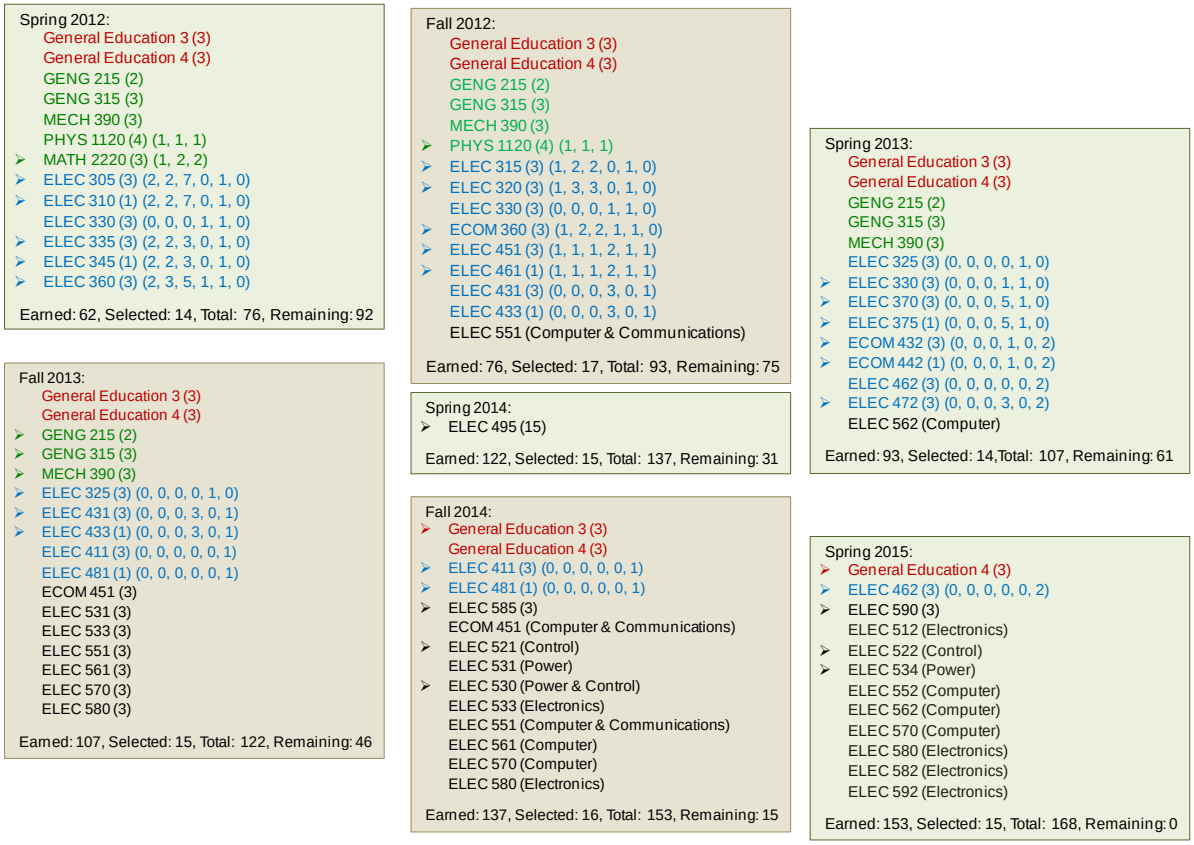

Figure 8: A complete course plan consisting of seven semesters.

Analyzing courses for Spring 2012 semester shows that instead of 23+ courses only 13 are considered based on the prerequisite information. From these six courses are selected again based on the field priorities and the credit hours approaching the semester average. PHYS 1120 could have been considered but then the total number of semester credits would zone out from the average.

In case of near similar field priorities, the *Course Hierarchy* button from Figure 1 can be used to clear any doubts in the selection procedure. Figure 9 shows the 2012 semester courses in a graphical chart. The display shows all remaining courses other than the initially passed or currently registered. All 13 eligible courses comes out to be highlighted whereas the remaining ones as dimmed. Now, clicking on any of the highlighted courses shows a course hierarchical chart of Figure 10. The Figure shows the ELEC 305 hierarchal chart. This help procedure can clarify any confusion between similar field priorities and the student can make the right course selection choice.

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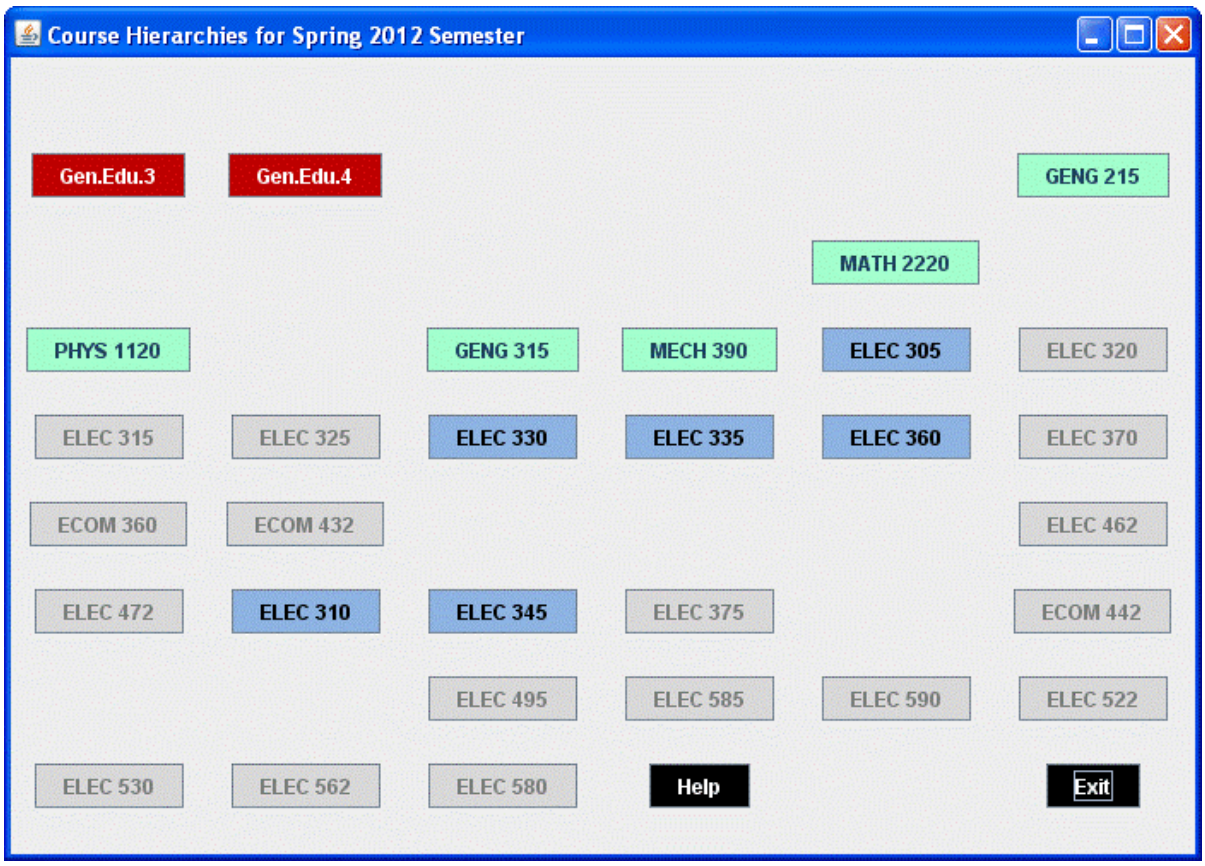

Figure 9: All eligible courses for the Spring 2012 semester.

The student selects courses equaling 17 CH for the Fall 2012 semester. Although heavier load but the selection is based on the balanced load of the remaining semesters and more importantly selecting courses based on the prioritized first three fields. The listing also shows an elective course (ELEC 551) being offered for selection. Such elective offerings in the earlier semesters are commonly ignored except if there is nothing else to choose.

Spring 2013 semester prefer course selections more on elective openings rather than courses suitable for industrial training. Training prerequisite courses can be managed in next (last) semester before training.

Fall 2013 semester selects all courses suitable for industrial training as well as any other course, which opens electives. The student understands that this is the last semester before training as the total is equal to or more than 114 credit hours, which is the prerequisite for training. Although electives are again considered for selection, however priority to select an elective before training is lower than any other compulsory course.

Spring 2014 semester is the industrial training semester based on the total number of 122 credit hours.

For the Fall 2014 and Spring 2015 semesters student selects all the remaining as well as at least two department electives each semester. Similar to some compulsory courses, department electives are also separated offer in two semesters. The system automatically displays all electives eligible and specific for the offering semester. The student selects an appropriate elective(s) of interests (Power & Control track for the typical student) as shown in Figures 8. However, at the course offering semester time the chances are that the earlier chosen electives may not be offered because not all semester electives are offered at all times. Then

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most definitely, the student has to choose another department elective being offered. Alternately, he/she may request a particular elective to be offered.

All engineering students take four General Education courses including the ESPU 1452 from other Faculties. Similar to the department electives not all university General Education courses are also offered in both semesters. Therefore, the system automatically selects courses with generic names such as General Education 2, etc. At the time of registration, student chooses courses of interest from a pool of university offered courses.

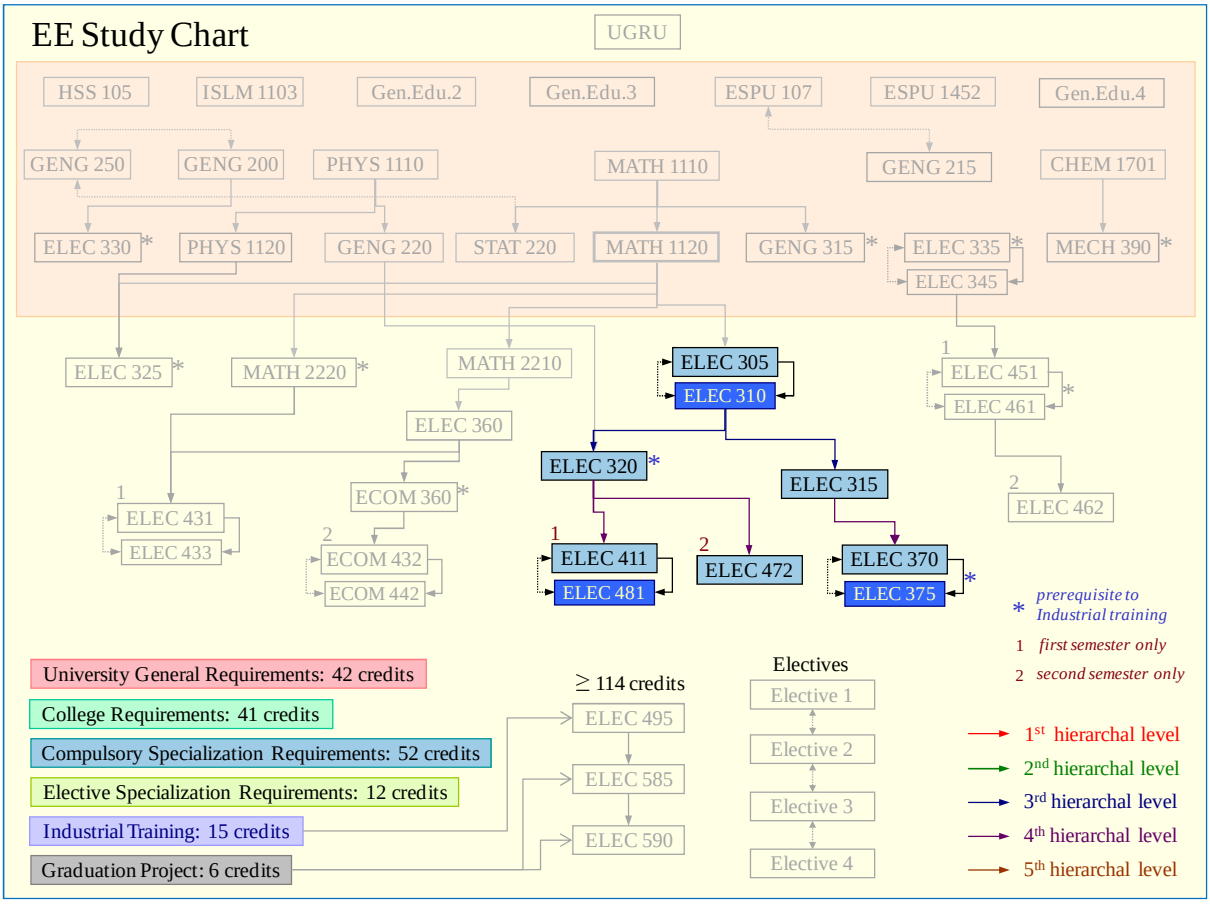

Figure 10: An individual course hierarchal chart.

TEST CASE # 2

This case is similar to Test Case # 1 except for the fact that the student using the advising system has now more credit hours to start with. This student has completed 73 credit hours of course work. The remaining # of credit hours is 168 – 73 = 95. Deleting another 15 (industrial training semester) leaves 80 credit hours to complete. The student's GPA of 3.9 has given an hint of 16 credit hours of course work per semester, and based on this average the student needs a total of six semesters including industrial training.

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A Complete Course Plan

Another complete course plan signifying all eligible courses that the student may pursue and their associated selections for six semesters is shown in Figures 11. Figure 12 in the Appendix shows the file format of the student's complete course plan as saved from the SAPS package.

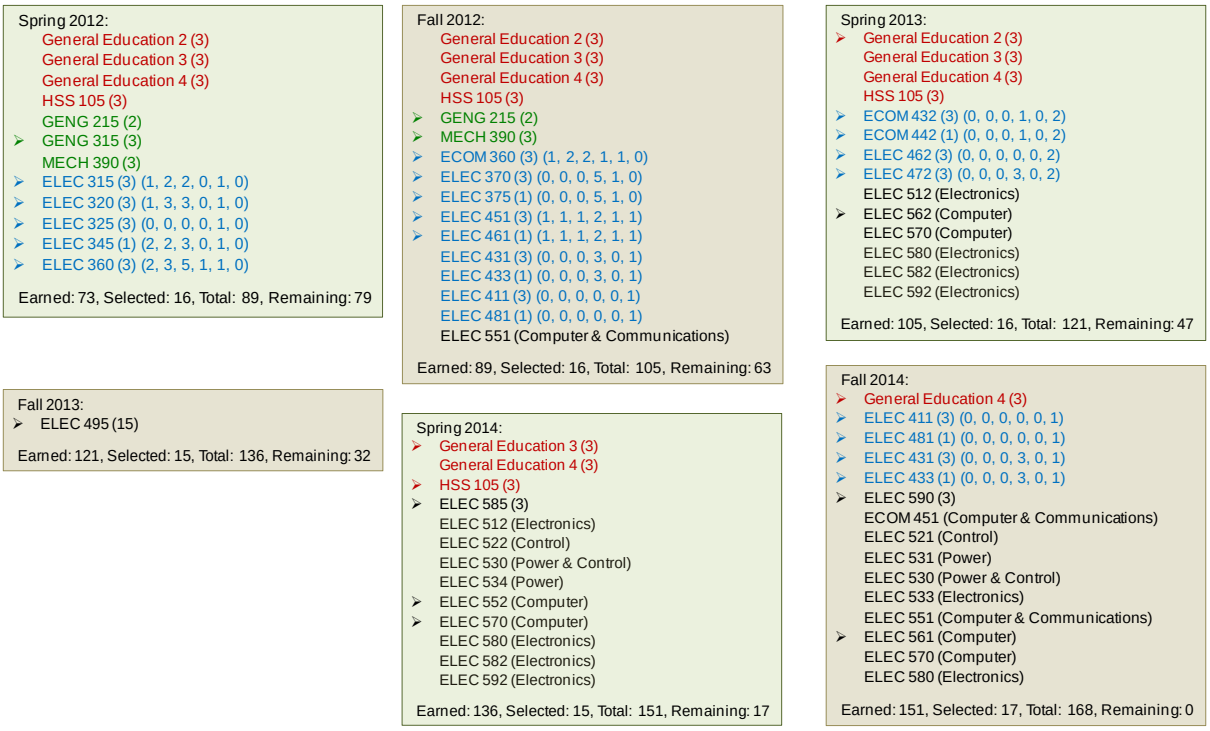

Figure 11: A complete course plan consisting of six semesters.

Analyzing courses for Spring 2012 semester shows that instead of again 23+ courses offered only twelve are fitting for the student to be selected based on the prerequisite information. From these, five department courses are selected based on the field priorities. One more course is needed to match the semester average. The four university courses have the lowest priority and it can be taken any time in the whole course of study. The remaining three ERU courses have the same priority level, which is prerequisite for industrial training. The student selects an ERU course of convenience.

Course selection for Fall 2012 semester has a minute complication associated with it. The student initially selects all courses based on the first three field priorities, which are ECOM 360, ELEC 451, and ELEC 461. The next level of selection is ELEC 370 & ELEC 375 both courses with opening of five electives and prerequisite for training. The courses ELEC 431 & ELEC 433 are an obvious next choice but the student selects from others. There are three main reasons for this selection; firstly, selecting the courses would be three laboratories in the same semester which is considered a heavy load, secondly, these courses are not required for industrial training whereas the others are, and lastly, the total credit hours would count to 15 whereas the selecting other two courses match the average.

Course selection for Spring 2013 semester shows one department elective and a General Education course being selected for the reason to reduce the final semester load of two electives and two remaining Labs.

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Fall 2013 semester is the industrial training semester based on the total number of 121 credit hours of course work completed.

Course selection for last two semesters after industrial training is apparent with no associated complications.

TEST CASE # 3

The student for this test case has completed 88 credit hours of course work. The remaining # of credit hours is 168 – 88 = 80. Deleting another 15 (industrial training semester) leaves 65 credit hours to complete. Four semesters other than the training semester is needed with an average course load of 16 credit hours per semester.

A Complete Course Plan

Another complete course plan signifying all eligible courses that the student may pursue and their associated selections for five semesters is shown in Figures 13.

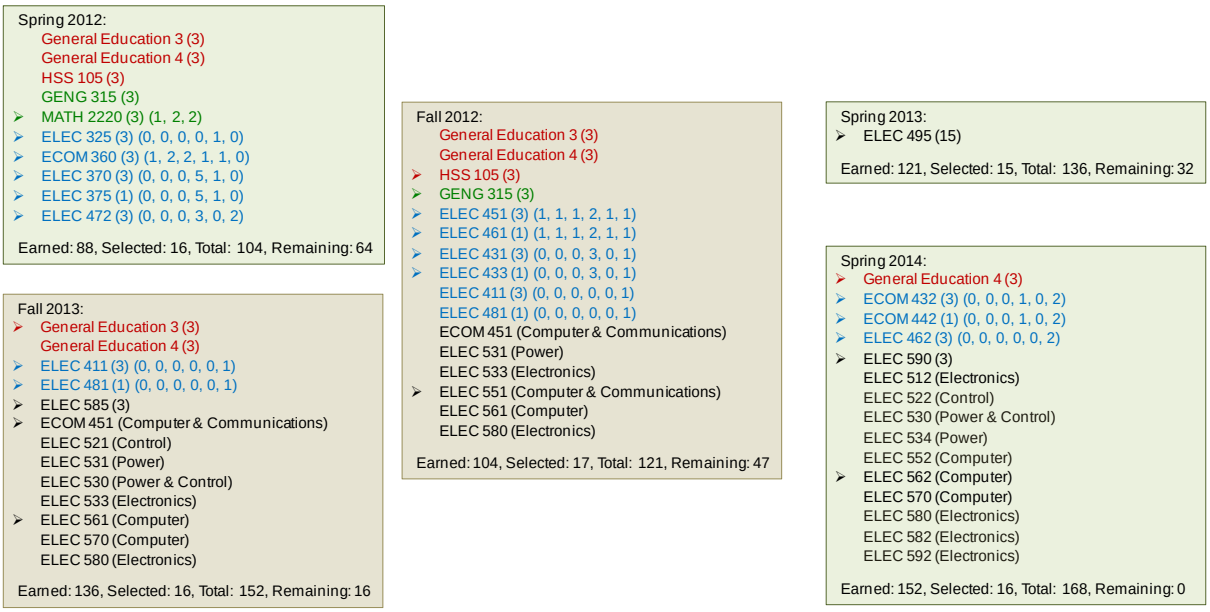

Figure 13: Another complete course plan consisting of five semesters.

The course selection for this typical student is as normal as it can be. Except of Fall 2012 semesters load all other semester matches the calculated average.

CONCLUSION

Student course registration is an important as well as a trivial process, which may encounter unnecessary graduation delays. United Arab Emirates University is one such institution where students have faced problems with advising and course registration. The Student Advising & Planning Software system has been devised to guide students in selecting appropriate courses suitable to register online with the University Registration System. SAPS is developed using JAVA computer programming language. The outcome of the course selection is stored (semester wise) to show a complete typical plan. Future work will concentrate on integrating the advising package for other department of the Faculty.

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APPENDIX

ID #: 200912373
NAME: Eiman Saeed Abdulla
MAJOR: Electrical Engineering
GPA: 3.91
Date: 09 - 01 - 2012

Total of earned and current courses:
UGRU, ESPU 107, MATH 1110, ISLM 1103, PHYS 1110, GENG 220, GENG 200, CHEM 1701, MATH 1120, STAT 220, PHYS 1120, MATH 2210, ESPU 1452, ELEC 305, ELEC 310, ELEC 330, ELEC 335, GENG 250, MATH_2220.

Total Credits: 73

Spring 2012:	GENG 315 Engg. Practice & Entrepreneurship (3) ELEC 315 Fund. Microelectronic Devices (3) ELEC 320 Electric Circuits II (3) ELEC 325 Engineering Electromagnetics (3) ELEC 345 Digital Logic Design Lab (1) ELEC 360 Signals & Systems (3)	Current Semester: 16, Total: 89
Fall 2012:	GENG 215 Introduction to Engg. Design & Ethics (2) MECH 390 Engineering Materials (3) ECOM 360 Fund. of Communication Systems (3) ELEC 370 Electronic Circuits (3) ELEC 375 Electronic Circuits Lab (1) ELEC 451 Microprocessors (3) ELEC 461 Microprocessors Lab (1)	Current Semester : 16, Total: 105
Spring 2013:	General Education 2 (3) ECOM 432 Data Communications & Networks (3) ECOM 442 Data Communications & Networks Lab (1) ELEC 462 Computer Architecture and Organization (3) ELEC 472 Power Systems (3) ELEC 562 Embedded Systems Design (3)	Current Semester: 16, Total: 121
Fall 2013:	ELEC 495 Industrial training (15)	Current Semester: 15, Total: 136
Spring 2014:	General Education 3 (3) HSS 105 Emirates Society (3) ELEC 585 Graduation Project I (3) ELEC 552 Computer Networks (3) ELEC 570 Special Topics in Computer Engg. (3)	Current Semester: 15, Total: 151
Fall 2014:	General Education 4 (3) ELEC 431 Control Systems (3) ELEC 433 Instrumentation and Control Lab (1) ELEC 411 Electric Energy Conversion (3) ELEC 481 Electric Energy Conversion Lab (1) ELEC 590 Graduation Project I (3) ELEC 561 JAVA Programming Applications (3)	Current Semester: 17, Total: 168

Figure 12: Saved file of the Test Case # 2 completed course plan.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 17 ISSN 1309-6249

ADOPTING SUPER-EFFICIENCY AND TOBIT MODEL ON ANALYZING THE EFFICIENCY OF TEACHER'S COLLEGES IN THAILAND

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ABSTRACT

Teacher's colleges located throughout Thailand have taken many inputs and outputs to achieve high academic performance. Since the teacher's colleges have a variety of educational production, their efficiency is diversely different. Super-efficiency data envelopment analysis (SE-DEA) has a potential to assess technical efficiency of firms and Tobit regression specially uses to analyze an uncensored score. Therefore, this study adopted two-step approaches to evaluate the technical efficiency of 40 teacher's colleges which collected cross-section data in 2011 from Office of the Higher Education Commission in Thailand. The super-efficiency DEA was initially assessed the efficient score followed by the Tobit regression employed to determine what factors affect the technical efficiency. Interestingly, number of graduate students, research and development, and intensity funds were considered into the Tobit regression. The results showed that the 40 colleges perform in technical efficiency differently. Moreover, those factors illustrate a different significance at various confidence levels.

Key Words: Data envelopment analysis (DEA), super-efficiency, teacher's colleges, technical efficiency, Tobit regression.

INTRODUCTION

Teacher's colleges were originally formed by the college systems in Thailand. Currently, they compose one of the university systems. The name "Rajabhat University" is called instead of the teacher's colleges that formerly named "Rajabhat Institutes". Almost every province in Thailand establishes one college in order to widely open

the opportunity to a local student who would like to be a teacher. The local student who nearly resides such a college has more good chance than the others. Consequently, the Rajabhat Universities are prevalently easier to gain admission than the government universities.

In 2012, there are 40 teacher's colleges located throughout the country (Chaaim, 2010). Those colleges have existed in Thai society since 1892 and have offered a variety of fields that focus more details on how to teach effectively (Juntep, 2012). Moreover, most colleges offer degree for undergraduate as well as graduate students. Meanwhile, the doctoral level can be found in some colleges. The teacher's colleges in Thailand are academic and research institute for n higher education of local community. They grant a society a good education to improve the quality of life. In addition, they use several factors to achieve the goal in teaching for the purpose of getting more knowledge of a student. Some techniques have been adapted to improve the skills of teaching and to make the student easily understand.

The teacher's colleges comprise a variety of departments and units. All work together efficiently in order to achieve the high academic performance and give the benefit back to a society. Unfortunately, some teacher's colleges lack of funds and education aids to increase the teaching quality. As a result, they are unable to achieve the same level of academic performance. This problem highly pushes the authors to study technical efficiency of the teacher's colleges in Thailand. Two-procedure concept of super-efficiency data envelopment analysis (SE-DEA) and Tobit regression are adopted in using for research method.

The two-procedure concept was prevalently used to efficiency assessment of decision making units (DMUs). Some papers followed this approach to evaluate the efficiency of studied firms. They are the useful methods in analyzing the technical efficiency. The efficient score is firstly assessed based on the special technique of SE-DEA introduced by Anderson and Petersen (1993). Tobit regression is finally used to analyze factors affecting the efficient score.

Perrigot and Barros (2008), for example, adopted the two-procedure concept to study French retailers' efficiency. Their results showed that the efficiency of French retailers was relatively high, besides that the four drivers; benchmark, rigour, initiative, and awareness had a significant effect on the efficiency. Nahra, Mendez, and Alexander (2009) employed the same approach to analyze the operative efficiency of treatment units of outpatient substance abuse from the 1995 National Drug Abuse Treatment System Survey (NDATSS). Their findings indicated that the super-efficiency scores can be increased by having many staffs, volunteers, and providers. Their findings also indicated that the super-efficiency method is more productive than the traditional DEA model because it provides an additional efficiency score (more than one)

Duan and Li (2010) applied the concept of super-efficiency and Tobit model in analyzing the interprovincial energy efficiency of China. Their conclusion showed two principal factors that affect energy efficiency scores were the energy price and technical progress. Moreover, Shanghai and Hainan were the benchmark areas because the super efficiency scores were always higher than 1.000. Similarly, Wang and Li (2011) applied the super-efficient DEA to assess the efficiency of China's commercial banks in corporation with Tobit regression. The results found that the super-efficiency scores of commercial banks were relatively low and two factors that significantly affect the banking efficiency were the ownership and the bank's scale.

Surprisingly, the findings reveal that no literature uses the two-procedure concept to specifically analyze the technical efficiency of teacher's colleges in Thailand. Therefore, the research aims to find out how technical efficiency of the teacher's colleges shows, as well as what factors affect the technical efficiency. The research's motivations are as follows, (i) it is useful to analyze the role of leading teacher's colleges in the national level, (ii) the technical efficiency of teacher's colleges have not been analyzed, despite they are important to Thai society, (iii) inefficient colleges are possibly able to improve their efficiency through the identification of the efficiency ranking and converge to the best-practice frontier, (iv) the colleges have a good

advantage in knowing what factors mostly affect the technical efficiency, and (v) this study can determine the influencing factors that enable the effective increase in the financial efficiency of firms.

METHOD

Data collection

The study obtained the secondary data from Office of the Higher Education Communication of Thailand. The data type is the cross section data that collected through the 40 teacher's colleges in 2011. These colleges are located in the capital, central, and regional areas throughout the country. They have been established in Thailand for a long time and have great influence on Thai society. They are not only the experienced, largest, and well-known in education but also they effectively operate in academic administration. Furthermore, some of colleges have many campuses located across Thailand in order to extensively offer an admission to the local students who have less opportunity in earning higher education.

As the number of teacher's colleges in Thailand has 40 universities, those can be classified into five groups based on the locations as Table 1.

Table 1: Teacher's colleges located in different locations of Thailand

Location	College's name
Bangkok (the capital of Thailand)	1. Suan Sunandha Rajabhat University
	2. Suan Dusit Rajabhat University
	3. Chandrakasem Rajabhat University
	4. Phranakhon Rajabhat University
	5. Dhonburi Rajabhat University
	6. Bansomdejchaopraya Rajabhat University
North	7. ChiangMai Rajabhat University
	8. Chiangrai Rajabhat University
	9. Lampang Rajabhat University
	10. Uttaradit Rajabhat University
	11. Pibulsongkram Rajabhat University
	12. Kamphaengphet Rajabhat University
	13. Nakhon Sawan Rajabhat University
	14. Phetchabun Rajabhat University
Northeast	15. Udon Thani Rajabhat University
	16. Rajabhat Maha Sarakham University
	17.Loei Rajabhat University
	18. Sakon Nakhon Rajabhat University
	19. Nakhon Ratchasima Rajabhat University
	20. Buriram Rajabhat University
	21. Surindra Rajabhat University
	22. Ubon Ratchathani Rajabhat University
	23. Kalasin Rajabhat University
	24. Roi Et Rajabhat University
	25. Chaiyaphum Rajabhat University
	26. Sisaket Rajabhat University
Central	27. Phranakhon Si Ayutthaya Rajabhat University
	28. Rambhai Barni Rajabhat University
	29. Rajabhat Rajanagarindra University

	30. Thepsatri Rajabhat University
	31. Valaya Alongkorn Rajabhat University
	32. Phetchaburi Rajabhat University
	33. Kanchanaburi Rajabhat University
	34. Nakhon Pathom Rajabhat University
	35. Muban Chombueng Rajabhat University
South	36. Suratthani Rajabhat University
	37. Nakhon Si Thammarat Rajabhat University
	38. Phuket Rajabhat University
	39. Songkhla Rajabhat University
	40. Yala Rajabhat University

Analysis strategies

Two-procedure concept of super-efficiency data envelopment analysis (SE-DEA) together with Tobit regression was used for the research's approaches. The concept of SE-DEA proposed by Anderson and Petersen (1993) was firstly conducted to assess the differently efficient scores of decision making units (DMUs). After technical efficiency scores were precisely reported by SE-DEA model, the Tobit regression was finally analyzed to consider how factors affecting the efficient scores.

Data envelopment analysis (DEA)

Concept of data envelopment analysis (DEA) is, therefore, necessary to know before going through the SE-DEA model. DEA was initially proposed by Farrell (1957). He adopted the principle of frontier analysis for firm's efficiency assessment. Later, Charnes, Cooper, & Rhodes (1978) consolidated this concept as a nonparametric analysis in using efficiency measurement. DEA uses a linear programming methodology to convert inputs used into outputs produced (Charnes, Cooper, & Rhodes, 1981). The attribution of this method is an unfunctional model that is able to analyze multi-inputs and multi-outputs. In addition, DEA defines a "frontier" in order to compare the relative performance of units/firms against the best producers. The efficiency score in DEA model is ranged from zero to one. The highest score (one) defines maximum efficiency, while a score of less than one shows a firm's inefficiency, indicating the relative displacement away from the frontier. The two ways to consider efficiency are to produce a greater quantity of outputs with the same number of inputs and to use fewer levels of inputs with the same quantity of outputs.

Moreover, the DEA concept is popularly used in measuring productive efficiency of units/firms by the consideration of multi-inputs and outputs. The qualitative and quantitative variables can be analyzed at a time through mathematical linear program in the purpose of finding the cause of inefficiency. Consequently, many researchers have conducted related studies based on this concept. Some researchers used the DEA approach to analyze the technical efficiency for their studies (Allen & Thanassoulis, 2004; Gattoufi, Oral, & Reisman, 2004; Hermans, Brijs, Wets, & Vanhoof, 2009; Wu, Xie, & Zhao, 2010).

The different concept of DEA depends on whether it is an input-oriented or output-oriented model and whether its condition presents a constant or variable-return-to-scale model. The input-oriented DEA model tries to minimize quantity of input, producing the same level of outputs as the unit in question. Meanwhile, the output-oriented DEA model finds the way to maximize quantity of output with the same amount of inputs as the unit in question. The constant-return-to-scale (CRS) model supposes that output level is proportional to the input level for a given unit. On the other hand, the variable-return-to-scale (VRS) model allows the output level is proportionally higher or lower than an increase in inputs.

As adapted from Charnes, Cooper, & Rhodes (1981), the output-oriented CCR-DEA model measure the efficiency scores (E_j) for peer decision making units or DMUs ($j = 1, \dots, z$). The efficiency assessment depends on

the selected outputs (Y_{ai}, a = 1, … , n) and inputs (X_{bi}, b = 1, … , m), expressed by the linear programming methodology:

$$\text{Maximize: } E_j = \sum_{a=1}^{n} v_{aj} Y_{aj} \quad (1)$$

$$\text{Subject to the constraints: } \sum_{b=1}^{m} u_{bj} X_{bj} = 1 \quad (2)$$

$$\sum_{a=1}^{n} v_{as} Y_{as} \leq \sum_{b=1}^{m} u_{bs} X_{bs} \quad (3)$$

$$v_{aj}, u_{bj} > 0 \text{ for all } a, b, \text{ and } j. \quad (4)$$

The observed outputs *(Y_{aj})* and inputs *(X_{bj})* are treated as the constants. Output weight *(v_{aj})* added to maximize the efficiency of unit *j*, while input weights *(u_{bj})* conform the proposed constraints of Equation (2). Finally, the technical efficiency of each DMU *(j)* is solved by adapting the linear program, providing the score with an upper bound of one. This upper limit is forced by constrainted set as Equation (3).

Super-efficiency data envelopment analysis (SE-DEA)

Under the basic CCR-DEA concept, the unit showing the best performance with the efficiency score of one indicate that they are a part of the production frontier which cannot be compared with its frontier. A more advanced technique that incorporates the basic DEA principle has been termed “Super-efficiency Analysis” introduced by Andersen and Petersen (1993). They created the specific technique by relaxing the upper bound of one for the efficiency firm in the basic DEA model in order to compare with its production frontier empirically. Therefore, full information of such efficiency firms is restored without limitation of the upper bound. This technique has definitely consolidated the standard concept of DEA. Super-efficiency scores will be greater than or equal to one implying that the analysis provides the additional information regarding the relative performance of the efficiency firms. This technique leads to the determination of the relative placement regardless of the inefficiency firms. Since inefficient firms are unable to expand the range of production frontier, the super-efficiency analysis will not change the technical score of inefficient firms. This will certainly be under the territory of the production frontier. Having an unlimited bound of measurement, the efficiency is able to give more information of the scores. Therefore, the determinant affecting the efficient score can further be analyzed.

An alternative method of DEA that allows the upper bound for the efficient units greater than or equal to one has been named “Super-efficiency Analysis”. This distinctive technique not only can eliminate the upper bound of technical efficiency, but also provide the additional information regarding the relative performance of efficiency units. Regardless of the modified technique, the unit is still efficient when it is included in the determination of the frontier. Thus, the efficiency units located on the frontier implies that the unit is unable to be no less or more efficient when comparison with the other units along the frontier as well as the efficiency units are above the frontier, performing more efficiency than the other units. This technique is outstanding research method and has ability to reveal unrestricted data potentially.

Having an unbounded efficiency measurement extensively increases an ability to study the factors affecting the efficiency score for any given firms/units. Recently, several papers applied the technique of super-efficiency data envelopment analysis in using the main research’s method. Such distinctive researches could be found in Zhu (2001), Chen (2005), Banker & Chang (2006), Khodabakhshi (2007), and Chen, Deng, & Gingras (2011).

Andersen and Petersen (1993) stated that the concept of super-efficiency DEA model can be computed by using the linear programming methodology as follows:

$$\text{Maximize: } E_j = \sum_{a=1}^{n} v_{aj} Y_{aj} \quad (5)$$

$$\text{Subject to the constraints: } \sum_{b=1}^{m} u_{bj} X_{bj} = 1 \quad (6)$$

$$\sum_{\substack{a=1 \\ s \neq j}}^{n} v_{as} Y_{as} \leq \sum_{\substack{b=1 \\ s \neq j}}^{m} u_{bs} X_{bs} \quad (7)$$

$$v_{aj}, u_{bj} \geq 0 \text{ , for all } a, b, \text{ and } j. \quad (8)$$

The linear program methodology is used to solve the above formulation for each unit, allowing continuous technical efficiency score with unrestricted bound. The difference of super-efficiency and traditional data envelopment analysis (CCR-DEA) models is the exclusion of unit *j* as the constraint set in Equation (7). As described before, when the unit *j* is included in Equation (7), making the maximum score of efficiency can be limited to one. Notably, the under evaluation unit is no longer in the second constraint ($s \neq j$). Thereby, the outputs are maximized without restriction.

Outputs and inputs measured in SE-DEA model

SE-DEA methodology is used in this research in order to show the empirical results are consistent with those obtained from the CCR-DEA model. Moreover, the SE-DEA can provide additional information regarding the determinants of efficiency by using the smaller sample sizes. Interestingly, this paper employed three outputs and four inputs measured in the SE-DEA model. The number of publications *(Y1)*, graduated students *(Y2)*, and employed students *(Y3)* were conducted as the outputs measured. Meanwhile, four inputs comprise the number of teachers *(X1)*, students *(X2)*, full-time staffs *(X3)*, and part-time staffs *(X4)*.

In terms of outputs, the variable of publications *(Y1)* includes the manuscript that published in both international and internal academic journals. The variable of graduated students *(Y2)* was summarized only the students who expect to graduate and graduated in academic year 2011. In addition, the employed students' variable *(Y3)* included part-time and full-time jobs. On the other hand, the number of teachers *(X1)* included the number of lecturers, assistant professors, associated professors, and professors. Undergraduate students and graduate students were counted by the variable of students *(X2)*. The variable of full-time staffs *(X3)* and part-time staffs *(X4)* consist of the number of officials who are working at affiliated campuses.

Tobit model

Tobit model is further employed to analyze what determinants affect the technical efficiency. The Tobit model is also known as truncated or censored regression model. The technical efficient function of teacher's colleges in Thailand is written as Equation 1:

$$E_i = \alpha + \beta_1 P_i + \beta_2 I_i + \beta_3 S_i + \beta_4 Y_i \, e \quad (9)$$

where, E_i indicates the technical efficiency scores of teacher's colleges, P_i indicates personnel's quality, I_i indicates intensity funds, S_i indicates research and development, Y_i indicates established years of the teacher's colleges, *i* indicates the number of teacher's colleges or decision-making units (DMUs), α indicates a constant term, β_1 - β_3 indicate the coefficient of independent variables, and *e* indicates an error term which $e \sim N(0, \sigma^2)$.

When SE-DEA scores are transformed into the dependent variable *(Y)*, the coefficients of the Tobit model can be interpreted as it is a coefficient of an ordinary least squares regression. This function indicated proportionate change of dependent variable with respect to one unit change in independent variables, while holding other factors constant.

Hypotheses

This study proposed some hypotheses to determine how factors affect the technical efficient score of Thai teacher's colleges.

Hypothesis 1: The teacher's college that has high personnel's quality *(P)* is likely to have high technical efficiency scores *(E)*.

Hypothesis 2: The teacher's college that has more intensity funds *(I)* is likely to have high technical efficiency scores *(E)*.

Hypothesis 3: The teacher's college that has more research and development *(R)* is likely to have high technical efficiency scores *(E)*.

Hypothesis 4: The teacher's college that has established for many years *(Y)* is likely to have high technical efficiency scores *(E)*.

FINDINGS

Super-efficiency's results

The technical efficiency scores and ranks of the 40 teacher's colleges in Thailand are illustrated in Table 2. As the special technique of super-efficiency shows a considerable difference concerning all scores of technical efficiency, including inefficient firms, the teacher's colleges present different technical efficiency. There were seven DMUs with the score of more than one, namely, Kalasin Rajabhat University, Phranakhon Si Ayutthaya Rajabhat University, Ubon Ratchathani Rajabhat University, Thepsatri Rajabhat University, Dhonburi Rajabhat University, Rajabhat Rajanagarindra University, and Pibulsongkram Rajabhat University. Surprisingly, with the same approach, 33 teacher's colleges were inefficient in technology, including many colleges that located in Bangkok and central of Thailand such as Suan Dusit Rajabhat University and Suan Sunandha Rajabhat University. Comparing among the DMUs, Kalasin Rajabhat University performs the maximum efficiency score with 2.6934 and represents the best in technical performance. On the other hand, Phranakhon Rajabhat University has the minimum efficiency score with 0.1922 and shows the worst in groups.

Generally, the scores of the first seven DMUs could not be provided by the traditional data envelopment analysis (DEA) model. However, additional information could be obviously derived due to the special technique of super-efficiency method (Andersen and Petersen, 1993). The results also show a considerable difference concerning all scores of the technical efficiency, including the 33 inefficient firms. Based on the results shown in Table 2, several colleges need to improve a lot in their technical efficiency, especially the college that has less efficiency. For the colleges obtained efficient scores more than one, they have to keep their standardization so that they can compete with the others. Finally, the super-efficiency scores provide additional information for the purpose of studying factors affecting the technical efficiency scores of teacher's colleges by using Tobit regression in the next step.

Table 2: Technical efficiency scores of 40 Teacher's colleges in Thailand

Rank	DMU	Score	Rank	DMU	Score
1	Kalasin Rajabhat University	2.6934	21	Surindra Rajabhat University	0.6367
2	Phranakhon Si Ayutthaya Rajabhat University	2.1217	22	Kamphaengphet Rajabhat University	0.6000
3	Ubon Ratchathani Rajabhat University	1.6710	23	Muban Chombueng Rajabhat University	0.5916
4	Thepsatri Rajabhat University	1.5983	24	Roi Et Rajabhat University	0.5373
5	Dhonburi Rajabhat University	1.5246	25	Nakhon Si Thammarat Rajabhat University	0.5354
6	Rajabhat Rajanagarindra University	1.3971	26	Buriram Rajabhat University	0.5157
7	Pibulsongkram Rajabhat University	1.1244	27	Suan Dusit Rajabhat University	0.4971
8	Sisaket Rajabhat University	0.9762	28	Suratthani Rajabhat University	0.4898
9	Sakon Nakhon Rajabhat University	0.9406	29	Rambhai Barni Rajabhat University	0.4508
10	Chaiyaphum Rajabhat University	0.9100	30	Nakhon Pathom Rajabhat University	0.3942
11	Valaya Alongkorn Rajabhat University	0.8768	31	Suan Sunandha Rajabhat University	0.3616
12	Chiangrai Rajabhat University	0.8378	32	Songkhla Rajabhat University	0.3511
13	Loei Rajabhat University	0.8205	33	Phetchabun Rajabhat University	0.3470
14	Kanchanaburi Rajabhat University	0.7652	34	ChiangMai Rajabhat University	0.3226
15	Phetchaburi Rajabhat University	0.7642	35	Yala Rajabhat University	0.3202
16	Bansomdejchaopraya Rajabhat University	0.7002	36	Chandrakasem Rajabhat University	0.2977
17	Udon Thani Rajabhat University	0.6755	37	Lampang Rajabhat University	0.2713
18	Nakhon Sawan Rajabhat University	0.6626	38	Phuket Rajabhat University	0.2422
19	Uttaradit Rajabhat University	0.6598	39	Rajabhat Maha Sarakham University	0.2056
20	Nakhon Ratchasima Rajabhat University	0.6449	40	Phranakhon Rajabhat University	0.1922

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 17 ISSN 1309-6249

Tobit regression's results

To further investigate the effects of concerned variables on the technical efficiency of those teacher's colleges, the study follows with a Tobit regression. The regression's model consists of three independent variables, personnel's quality (*P*), intensity funds (*I*), research and development (*S*), and established years *(Y)*. Super-efficiency scores derived from Table 2 were served as the dependent variable *(E).* Those variables efficiently function to carry out differently significant levels. The empirical results analyzed by the Tobit regression model are shown as Table 3.

Table 3: Tobit regression's results

Variable		Coefficient	Std. Error	Z-Statistic	Prob
Constant	(c)	1.2041**[1]	0.5516	2.1829	0.0290
Personnel's Quality	(P)	0.0980***[1]	0.0275	3.5668	0.0004
Intensity Funds	(I)	0.4538**[1]	0.1737	0.1276	0.0235
Research & Development	(R)	0.0070*[1]	0.0042	1.6636	0.0962
Established Years	(Y)	- 0.0222[ns][2]	0.0034	-1.4589	0.8985

[1] *, **, and *** indicate the significant level at 10, 5, and 1%, respectively.
[2] *ns* indicates non-significant level

According to the observed results, three variables have different significance at various confidence levels. Considering the factor of personnel's quality (*P*), this factor has a positive sign which is consistent with the assumption. An increasing more personnel's quality would increase the technical efficiency with the significant level at one percent. When personnel's quality arises 9.80%, the efficient scores would increase 100%. Therefore, the personnel's quality is the variable that directly affects an increasing of the technical efficiency score. Those teacher's colleges need to hire a person who have high ability performance in order to improve the technical efficiency for the whole perspective.

The factor of intensity funds *(I)* was consecutively considered. This factor expected to show a positive sign which is consistent with the basic hypothesis that increasing of intensity funds would make the technical efficiency up with the significant level at five percent. The intensity funds that increase at 45.38% will make the technical efficient score elevate up to 100%. Undoubtedly, this factor has an ability to affect the technical efficiency scores. Refer to the result; it can say that, it will be better to have more funds, especially research's funds.

Next, the factor of research and development *(R)* show a positive sign which is consistent with the hypothesis. An increasing the number of research and development would increase the technical efficiency at ten percent significant level. When number of researches and developments increase 0.7%, making the technical efficiency arise to 100% successively. So, the technical efficiency scores could increase by encouraging a college to produce more researches and developments. This factor is very important to the country's development because policy-makers will guide the policy based the research from those colleges.

Finally, the factor of established years *(Y)* showed a negative sign which is surprisingly inconsistent with the assumption. Based on the analysis of Z-Statistic, the established year's variable is unable to explain the technical efficient score at any significant level because the result showed non-significant factor. This factor has been

neglected when considering how determinants affect the technical efficiency. Its result can be referred that the technical efficiency of teacher's colleges in Thailand will be fluctuated regardless how many year such a college established in a community.

In conclusions, based on the Tobit regression model, the technical efficient score of those teacher's colleges in Thailand could be improved through three main variables, personnel's quality *(P)*, intensity funds *(I)*, and research and development *(R)* with differently significant levels. Meanwhile, the variable of established years *(Y)* could empirically not explain in this research.

DISCUSSION AND CONCLUSIONS

Discussion

This study has shown the simplicity and advantage of the two-procedure concept; thus encouraging researchers to employ super-efficiency data envelopment analysis (SE-DEA) as well as Tobit regression to efficiency measurement a variety of aspects such as universities, hotels, insurance companies, science's schools, hospitals, etc. The use of super-efficiency scores provide more clear advantages than the traditional data envelopment analysis (DEA) models because the super-efficiency model uses all information in the studied samples by relaxing the upper boundary of the standard method.

The two-procedure concept could effectively function to carry out the technical efficiency of the 40 teacher's colleges in Thailand. The special technique of super-efficiency model is able to provide additional information of the technical efficiency scores of more than one. Besides, the Tobit regression is a suitable function that has a great potential to analyze factors affecting the technical efficiency for decision-making units (DMUs). These methods are effective technique in analyzing uncensored data.

As the 33 teacher's colleges could not reach the technical efficiency, revealing the situation of their operations in 2011 was not quite good. This reflects the big problems in educational management of Thailand. An academic institution must achieve the technical efficiency as much number as possible so that the potential in human development would increase consecutively. Since education is fundamental factor to develop the country, the country will shift from the developing country to developed country if Thailand has many efficient colleges.

For the developing country like Thailand, it is important to encourage the teacher's colleges to improve their technical efficiency because they closely located in local community and are able to reach a local student who will be the national force in the future. Furthermore, the variables of personnel's quality, intensity funds, and research and development are reasonable determinants in significantly affecting technical efficiency as the expected results of basic hypotheses.

Conclusions

Teacher's colleges play an important role towards Thailand's education. They offer more skills and knowledges to a student who studies teaching program and wants to develop a local community. The 40 teacher's colleges established throughout Thailand comprise more backgrounds and expert in special study's fields. However, technical efficiency and determinants affecting the efficient score are the interesting issues that encourage to study. Therefore, two-procedure concept, adopting super-efficiency as well as Tobit regression analysis, is employed to be the research's methods.

The empirical results of super-efficiency data envelopment analysis (SE-DEA) showed that there are only seven out of forty colleges that perform the higher efficiency more than one. Meanwhile, nearly three-fourth of teacher's colleges faced the technical inefficiency. The best performance in technical efficiency was Kalasin Rajabhat University, located in the northeastern regions of Thailand. On the other hand, the teacher's college

that performed poorly in technical efficiency was Phranakhon Rajabhat University, located in Bangkok, the capital of Thailand.

Considering factors affecting the technical efficiency scores, the results indicated that the first, second, and third hypotheses could be accepted at differently significant levels. Only, the fourth hypothesis was rejected because its variable showed non-significance. Three factors, personnel's quality *(P)*, intensity funds *(I)*, research and development *(R)*, are able to increase the technical efficiency. Meanwhile, the variable of established years *(Y),* could not lead to explain in the Tobit-regression model. It can be said that, such three variables place importance to technical efficiency of teacher's colleges in Thailand.

Lastly, the efficiency scores and ranks obtained from SE-DEA model could help inefficient colleges to improve their technical performance in order to be the leader among teacher's colleges in Thailand. Since there were many inefficiency teacher's colleges, their results have reflected some operation problems that have been occurred in educational sector of Thailand. This aspect shows that higher academic institutes need to improve their operations so that they can complete with the other academic institutes in the stage of international and internal levels.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 18 ISSN 1309-6249

AN OVERVIEW OF PRE-SERVICE EARLY CHILDHOOD TEACHERS' HUMOR STYLES

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ABSTRACT

The study aimed to investigate the humor styles of pre-service early childhood teachers. The population of the study was comprised of pre-service teachers being trained at the Department of Early Childhood Education of Afyon Kocatepe University. A total number of 214 pre-service early childhood teachers constituted the sample for this study. To gather data, a general information form and "Humor Styles Questionnaire" developed by Martin, Puhlik-Doris, Larsen, Gray and Weir (2003) and adapted to Turkish by Yerlikaya (2003) were utilized. Mann-Whitney U test was used in order to find out whether the participants' humor styles differed according to their genders while Kruskall-Wallis H test was used in analyzing the data to detect any differences according to the participants' academic years of study. At the end of the research, it was revealed that significant differences existed between the pre-service teachers' humor styles and their genders together with their years of study.

Key Words: Early Childhood Education, Teacher Qualifications, Humor Styles.

INTRODUCTION

Persistence of the basic knowledge and skills needed to be taught in the preschool period is closely related to the quality of education. Gained knowledge, skills, attitudes and habits of individuals within this period are very effective on their later lives. Therefore, from early years, the quality of environments where children's growth, development and learning take place becomes even more important. One of the key elements determining the quality of early childhood educational services and experiences is the personal and professional characteristics of the early childhood educator.

Early childhood educators offer quality educational service with their knowledge, skills and attitudes while they also play a critical role in the acquisition of behaviors mentioned in the program by children through the use of methods, techniques and educational strategies they choose (Robertson, 1996, Tuğrul, 2005; Gürkan, 2007). In early childhood education, providing children with effective learning process in which they construct new

understandings by interacting with other people, objects and events depends on the teacher's integration of technical knowledge gained during the pre-service education and personal characteristics. Apart from the professional qualifications such as a broad and comprehensive knowledge in the field and in the implementation of the program, both of which are a preschool teacher should possess, a preschool teacher at the same time must have personal characteristics such as enthusiasm, confidence, achievement expectation, encouragement and assistance, orderliness, flexibility, warmth and humor (Erden, 2001; Ceglowski & Bacigalupa, 2002; Tatar, 2004; NAEYC, 2006; Kandır, Özbey & İnal, 2010; Dağlıoğlu, 2011).

Making use of humor which is one of the personal characteristics that early childhood educators should possess is vital for children at educational settings. Humor is one of the actions that motivate children to learn. The use of humor in education provides an active learning environment and thus makes the learning process more enjoyable. That is, teachers who use humor to create a positive learning environment and hereby facilitating the learning process are indeed making the children become more open to learning, more attentive and enthusiastic as well as establishing good rapport with the children so as to foster creativity and lighten the stress load. Lefcourt, Davidson, Shepherd, Phillips, Prkachin and Mills (1995), stated that individuals move away from their negative experiences thanks to humor while Abel (2002) claimed that individuals with a high sense of humor used more of their positive cognitive reasoning and problem solving strategies in the face of stressful events than compared to individuals with low sense of humor. Aslan, Alparslan, Evlice, Aslan and Cenkseven (1999) suggested that humor is one of the coping mechanisms for difficult situations and problems occurring in life in that humor protect the individuals from the solid facts of life while facilitating the necessary adaptation. For all these reasons, the use of humor at educational settings by an early childhood educator who knows the characteristics and needs of children has positive effects on children's learning (Roeckelein, 2002; Küçükbayındır, 2003; Martin, Puhlik-Doris, Larsen, Gray & Weir, 2003; Avşar, 2008).

Humor is very effectual on children's learning and is considered as a desirable personality trait. Individuals with a high sense of humor are thought to have some distinguishing characteristics such as optimism, self-esteem, stress management skills, positive self-esteem, autonomy and social skills. However, sometimes humor can be used in a negative way at interpersonal settings (Kuiper & Martin, 1998; Yerlikaya, 2003; Hampes, 2006; Martin, 2007; Yerlikaya, 2009). Martin et al (2003) identified four different humor styles in the daily use of humor by individuals. This also refers to individual differences in the use of humor. Two of the humor styles are positive and healthy while the other two are negative and unhealthy within the context of psychological well-being (Erickson & Feildstein, 2007). While "affiliative" and "self-enhancing" humor styles reflect the positive and adaptive characteristics of personality, "aggressive" and "self-defeating" humor styles address negative and maladaptive aspects of personality traits. The first two positive styles are negatively correlated with anxiety and depression and positively correlated with self-esteem, extraversion, openness and agreeableness. The last two are negatively correlated with agreeableness and conscientiousness and positively correlated with neuroticism, hostility and aggression (Martin et all, 2003; Kazarian & Martin, 2004; Saroglou & Anciaux, 2004; İlhan, 2005; Hampes, 2006; Tümkaya, 2006; Yerlikaya, 2009).

That early childhood educators use these positive and healthy humor styles at educational settings will facilitate the realization of effective and lasting learning. Incidentally, this requires the development of pre-service early childhood educators' humor styles. From this point of view, in this study it was aimed to investigate the humor styles of pre-service early childhood educators.

METHOD

This survey-type study is descriptive in nature as it aims to investigate whether pre-service early childhood educators' humor styles differ significantly from gender and academic year variables.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 18 ISSN 1309-6249

Population and Sample

The population of the study consisted of the students at Afyon Kocatepe University, Faculty of Education, Department of Early Childhood Education. 214 pre-service early childhood educator constituted the sample for this study based on voluntariness.

Data Collection Tool

To gather data, a general information form inquiring demographical characteristics of the students and "Humor Styles Questionnaire" developed by Martin, Puhlik-Doris, Larsen, Gray and Weir (2003) and adapted to Turkish by Yerlikaya (2003) were utilized in order to measure the four different dimensions (affiliative humor, self-enhancing humor, aggressive humor and self-defeating humor) regarding the individual differences in daily use of humor. The questionnaire included items to assess four different types of humor; thus it was composed of four sub-scales. These subscales are named as Affiliative Humor, Self-enhancing Humor, Aggressive Humor and Self-defeating Humor. The scale included seven point Likert type ratings ranging from "Strongly Agree" to "Strongly Disagree" and each of the subscales included eight items. In "Humor Styles Questionnaire" there were eleven items scored in reverse direction. The scores from each subscale showed the frequency of use of the related humor style. Cronbach's alpha internal consistency coefficients derived for each subscale during the adaptation process are found as for Affiliative Humor, .74; for Self-enhancing Humor, .78; for Aggressive Humor, .69 and for Self-defeating Humor, .67. Test-retest reliability coefficients for each subscale were found as .88, .82, .85, .85 respectively (Yerlikaya, 2003).

Data Analysis

In the analysis of the data gathered, demographical information regarding the participants was given by making use of descriptive statistics such as frequency and percentage values. In order to find out whether the scores of the pre-service early childhood educators displayed normal distribution, Shapiro-Wilk test was utilized. Since the scores did not show normal distribution Mann-Whitney U, a non-parametric test, was used in order to find out whether the participants' humor styles differ according to their gender while Kruskall-Wallis H test was used in analyzing the data to detect any differences according to participants' academic years. Significance level in this study was set as .05 which refers to a significant difference in case of $p<.05$ whereas $p>.05$ addresses a non-significant difference (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz & Demirel, 2011).

FINDINGS AND DISCUSSION

Demographical information regarding the participants in the sample was given in Table 1.

Table 1: Demographical Characteristics of Pre-service Early Childhood Educators

Demographical Characteristics		*Academic year*									
		1st year		*2nd year*		*3rd year*		*4th year*		*Total*	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Gender	Female	83	86.5	28	75.7	34	87.2	38	90.5	183	85.5
	Male	13	13.5	9	24.3	5	12.8	4	9.5	31	14.5
	Total	96	100	37	100	39	100	42	100	214	100
Age	17-21 years	91	94.8	25	67.6	19	48.7	3	7.1	138	64.5
	22 years and above	5	5.2	12	32.4	20	51.3	39	92.9	76	35.5
	Total	96	100	37	100	39	100	42	100	214	100

Table 1 shows that 85.5 % of the pre-service early childhood educators are female; 14.5 % are male, 64.5 % are between 17 and 21 years old while 35.5 % are 22 years old or above.

Mann-Whitney U test results of the scores according to the participants' gender are given in Table 2.

Table 2: Mann-Whitney U Test Results of the Scores According to the Participants' Gender

				Mann-Whitney U	
Humor Styles	***Gender***	***n***	***Mean Rank***	***U***	***p***
Affiliative Humor	Female	183	110.6	2266	0.073
	Male	31	89.1		
Self-enhancing Humor	Female	183	108.2	2711	0.694
	Male	31	103.5		
Aggressive Humor	Female	183	102.5	2003	0.010*
	Male	31	133.4		
Self-defeating Humor	Female	183	105.6	2495.5	0.284
	Male	31	118.5		

*p<.05

Table 2 shows that there was no significant difference found between participants' gender and the their mean scores of affiliative humor ($U_{(F-M)}$=2266, p>.05), self-enhancing humor ($U_{(F-M)}$=2711, p>.05), self-defeating humor ($U_{(F-M)}$=2495.5, p>.05) whereas a significant difference was apparent between the mean scores of aggressive humor ($U_{(F-M)}$=2003, p<.05) and the participants' gender. In addition, mean scores mentioned in Table 2 also reveals that aggressive humor style scores of males outnumbered the mean scores of females.

In terms of studies of humor carried out so far, it can be seen that a number of studies have discussed the effect of gender and gender roles on humor styles. Such research has found out that using aggressive humor style was more common among males compared to females (Saroglou & Scariot, 2002; Yerlikaya, 2003; Kazarian & Martin, 2004; Chen & Martin, 2007; Avşar, 2008; Erözkan, 2009; Traş, Arslan & Mentiş-Taş, 2011). Yerlikaya (2007) found out that aggressive and self-defeating humor styles were more common among male students. Führ (2002), in a survey of students aged between 11-14 years old, stated that males used aggressive and sexual humor more often while females use humor just to amuse themselves with an increasing amount accompanying their growth. Likewise, Kazarian and Martin (2006) claimed that males used all four types of humor more than females; commonly aggressive and self-defeating humor. After a short literature analysis, it is obvious that the results of the studies conducted so far are consistent with the findings of this study.

Societies have identified many role behaviors for men and women according to gender. These gender roles also reflect on the humorous behaviors of individuals. According to Kotthoff (2006) femininity and masculinity in gender roles and adjectives attributed to these roles are one of the factors determining which type of humor is appropriate for each gender. Gender stereotypes assign more aggressive roles to males in comparison with females (Deceker & Rotondo, 2001; Roeckelein, 2002). Therefore it can be stated that aggressive gender roles attributed to males emerge as the types of humor styles males prefer.

Kruskal-Wallis H test results regarding the scores from Humor Styles Questionnaire according to pre-service early childhood educators' academic years are presented in Table 3.

Table 3: Kruskal-Wallis H test results regarding the scores from Humor Styles Questionnaire according to pre-service early childhood educators' academic years

Humor Styles	*Academic Year*	*n*	*Mean Rank*	*sd*	*Kruskall-Wallis H testi*		
					X^2	*p*	*Paired Comparison*
Affiliative Humor	First Year	96	93.1	3	9.392	0.025*	1-2 1-3 1-4
	Second Year	37	118.3				
	Third Year	39	119.1				
	Fourth Year	42	119.6				
Self-enhancing Humor	First Year	96	104.1	3	1.858	0.602	-
	Second Year	37	101.8				
	Third Year	39	118.2				
	Fourth Year	42	110.4				
Aggressive Humor	First Year	96	113.6	3	6.428	0.093	-
	Second Year	37	119.1				
	Third Year	39	90.9				
	Fourth Year	42	96.5				
Self-defeating Humor	First Year	96	114.4	3	3.087	0.378	-
	Second Year	37	97.8				
	Third Year	39	109.6				
	Fourth Year	42	98.3				

*p<.05

Table 3 presents no significant difference between pre-service early childhood educators' academic years and their self-affiliative (X^2= 1.858, p>.05), aggressive (X^2= 6.428, p>.05) and self-defeating (X^2= 3.087, p>.05) humor styles; in contrast, the difference between pre-service early childhood educators' academic years and their affiliative humor scores (X^2= 9.392, p<.05) was found out to be significant. According to the rank means affiliative humor style scores of pre-service early childhood educators who were in their first year of university education were found out to be significantly lower than those of other participants who were in their second, third or fourth years.

The correlation between the academic year of pre-service teachers and their humor styles has been a less common issue to be dealt with throughout the studies in the field. According to the literature, Kazairan and Martin's (2004) study on Lebanese university students, İlhan's (2005), Avşar's (2008), Sümer's (2008) and Erözkan's (2009) studies on Turkish university students all showed that the difference between humor styles and academic year at university was not statistically significant. To compare the results of this study with those of the studies conducted so far, the similarity of the findings, except for affiliative humor style, was remarkable. Affiliative humor style, which is one of the adaptive humor styles, is basically free of hostility and a style that develops interpersonal relations as a means of tolerance. Affiliative humor, on the other hand, is positively correlated with moods such as cheerfulness, self-esteem, intimacy, satisfactory relationship. Saroglou and Scariot (2002), as a finding of their study, stated that affiliative and self-enhancing humor styles were in direct proportion to self-acceptance and openness. Durmuş (2000) suggested that individuals with a high sense of humor used more frequently the optimistic and self-confident coping strategies. Kuiper and Martin (1993), in their study on university students, concluded that students with a high sense of humor had more positive self-concept and more control over their own lives while they also experience fewer negative emotions. Moreover, Sümer (2008) claimed that university students' mean scores of affiliative and self-enhancing humor styles were higher than those of aggressive and self-defeating humor styles both of which are considered as maladaptive

styles. In parallel with the findings of the aforementioned studies, similar findings were reported from the studies on Belgian high school students (Saroglou & Scariot, 2002), Lebanese university students (Kazarian & Martin, 2004) and eventually Canadian people (Martin et al, 2003). It can be stated that number of years spent at university increased with age allow the individuals to better understand themselves and people around them so these individuals develop more extrovert interpersonal relationships (İlhan, 2005; Hampes, 2006; Erözkan, 2009). Therefore, pre-service early childhood educators in their second, third or fourth years use affiliative humor style more than the freshmen due to the fact that they establish better interpersonal relationships and positive moods such as intimacy and dominance of positive emotions increased with age.

CONCLUSIONS AND SUGGESTIONS

Teacher qualifications are one of the important factors affecting the quality of education. As in other professions, these qualifications have a crucial role in determining the tasks and responsibilities of teachers, enhancing teacher performance and eventually training pre-service teachers according to such qualifications pre-determined.

As a result of this study, which aimed to investigate whether pre-service early childhood educators' humor styles differ according to gender and academic year variables, aggressive humor style scores of male pre-service teachers were found out to be higher than that of females. On the other hand, affiliative humor style scores of pre-service teachers who were in their first years at university were significantly lower than those of second, third and fourth year students.

Some suggestions may be put forward in parallel with the results of this study. Pre-service education of early childhood educators may include activities designed for developing their humor styles. Future studies may aim to investigate other factors (such as socioeconomic level, age, type of high school graduated, stress and anxiety level, subjective well-being, self-esteem, shyness, emotional intelligence) likely to affect humor styles of pre-service early childhood educators. Also cross-cultural studies with a high number of participants will contribute a lot to the literature so that researchers can have more opportunity to compare their findings.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 19 ISSN 1309-6249

THE MODERN GENERAL EDUCATION IN SERBIA

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ABSTRACT

General education, as an integral part of human education in general, provides a formative basis on which foundations human personality is entirely built. It can be acquired at various institutions and in different situations. However, the most organized forms of general education are obtained in primary schools, specially organized institutions of knowledge, experience and the like. The knowledge necessary to every human being is acquired in these institutions regardless of which specific occupations and avocation (profession) she or he deals with. It is "a passport for life" which allows people to choose what to do for a living, to take on a part of building a common future and to continue learning. It is, as such, a preparation for life and it should be organized in a way that it provides everyone without exceptions an opportunity to express their entire creative potential.

The contents of contemporary general education are being changed with the development of human society. They follow changes, in a certain society, caused by the development of industry, engineering, technology, information technology, political structures and others. In order to be able to follow all these changes, we need a broad range of knowledge and skills in a field of human life and work and even beyond that, which we will study in this paper. The subject of interest in this paper will be contemporary primary education, the factors that affect it, the content structure of general education and their ultimate effects.

Key Words: Primary schools, general education, changes, Serbia.

INTRODUCTORY CONSIDERATIONS

If a man wants to be successful in the society where he lives and works, he needs to acquire knowledge from different fields of: science, culture, art, language, social life, engineering, technology, work, relationships among people, sport, and etc. This kind of knowledge is called general knowledge and the education that comprehends knowledge in these fields is general education.

Human personality is being built entirely through general education. It represents an important basis on which all subsequent knowledge, abilities and skills are built because it follows almost all civilization heritages and scientific achievements needed to every human regardless the profession he or she goes into. Thus, it is said that this is "a passport for life" which provides a man with a possibility to choose what to do for a living as well as a possibility to independently create his own future.

General education is often equated with culture, so that it is a quite common case to find also a term universal-cultural education or general culture in literature. These two terms are interrelated and intertwined because general education serves as a carrier of culture on one hand and on the other culture is a cornerstone of a society.

Presently, general education in Serbia is faced by some new and different tasks of preparing young people for living and working in informational and technologically, not only changeable but unstable, unpredictable,

uncertain and demanding conditions. In the rapidly changing world in which knowledge is more complex and expands every day and information sources unfathomable multiply; data, information and fact can become irrelevant and obsolete before they are used. Having in mind the fact that the 21st century will be the century of knowledge when numerous progressive changes will appear in schools and general education, special attention must be paid exactly on the adoption and expansion of knowledge from various areas of human life and work.

FUNDAMENTALS AND CHARACTERISTICS OF GENERAL EDUCATION IN SERBIA

Regarding the general education development in Serbia, it is influenced as well as the world by numerous social changes which have altered its course and progress. In our country there are general education schools at the first and second level of education. Primary school is at the first level, which provides students with general education necessary for every person living in a modern society no matter whether he or she will later continue their education or go for work professions, it is compulsory for all citizens from seven to fifteen years of age and it lasts eight years. At the second level of schooling which lasts for four years, there is a gymnasium in addition to vocational schools as the school of general education in which student's level of general education is substantially expanded.

General education in Serbia today is experiencing a number of changes due to numerous changes incurred in our society, particularly in recent decades, as a result of its overall development. Innovations are brought by numerous reform attempts in order to eliminate current deficiencies in general education as a whole. In this direction, the principles, objectives and expected outcomes of education are defined in our country. The basic principles, on which mentioned reform endeavors are built, are:

1) Decentralization,
2) Democratization,
3) De-politicization (The Ministry of Education, 2004).

Decentralization implies a greater degree of school autonomy, which is a basic unit of internationalized education, in normative planning and organizing one's life and work as well as educational and cultural-educational activities in the community where it operates. "When schools increase control over their destiny it brings them many benefits (Stoll and Fink, 2000)". The decentralization of educational system in Serbia is one of the key issues of educational system reform and all segments related to its functioning. It applies to: education accessibility (involvement of all categories of children and citizens living in Serbia in the process of education, regardless social and economic status of their family, religion and special needs for special education program organization); education (refers to acquiring the appropriate degree of student's knowledge at all level of education) and the democratization of educational process (provides the active participation of all relevant and interested stakeholders in the educational process-parents, teachers, students, government representatives and others).

Democratization defines a law, guarantee, real possibility and opportunity that every citizen can acquire any level or type of education under the same and equal terms in all schools and non-school institutions. Democratization implies: acceptance and respect of (democratic) values: freedom, responsibility, equality, solidarity, dignity, etc. as well as making and adherence to (democratic) principles and procedures in decision making and practical action: tolerance, dialogue, debate, non-discrimination and others. In short, democracy in education implies two principles: the principle of equality (fairness, accessibility, and respect of the rights regardless of gender, age, racial, ethical and religious affiliation, place of living and financial status, ability and health status) and the principle of participation (the freedom of expressing, having an opinion, choice and active participation in decision making and in educational practice with accepting responsibility). "The preparation for active participation in the community life becomes, for education, a task which is increasingly recognized as democratic principles spread more and more in the world (Delor, 1996)".

De-politicization is the legal disabling of political engagement for members of social organizations or institutions which are expected to be politically impartial. This means that a school as an educational institution should be beyond the influence of political events in the country.

GENERAL EDUCATION IS SCHOOLS

General education in the Republic of Serbia includes: the compulsory general secondary education and the general-educational segment of secondary vocational education. Considering that general education is overall a very important lever of human education and it is present from the very beginning to the end of schooling, in this paper, we will attempt to introduce it in certain stages of schooling. “A school in the current development of human society was one of the main roads for acquiring education, preparing various personnel for different activities, and in its previous duration it was constantly exposed to changes and transformations (Djordjevic, 2000)”. One very important need is just general education because its significance is growing and “general education becomes increasingly necessary for more and more people as such and even broader (Bakovljev, 2003)”.

GENERAL EDUCATION IN PRIMARY SCHOOLS

A primary school is a main unit of a society and as such it is an institution of special national significance. “Education in primary schools is the basis and precondition of mastering the modern contents of general education, socializing the young generations, developing intellectual abilities and student’s morality (Jovanovic, 1004)”. It is a magnifying glass of our time, a mirror of a society we live and work in.

Obligation, gratuity, general educational character, accessibility and equality are the basic principles on which primary and compulsory education in Serbia is founded. Primary education is the right of every child, regardless of gender, race, nationality, social status, intellectual ability and religion.

General education goes on the curriculum which every school brings in accordance with certain documents prescribed by the Ministry of Education.

Compulsory primary education is intended for everyone with no exceptions. In the most developed countries it lasts for ten, eleven or twelve years, with a tendency to extend its duration. It lasts eight years in Serbia, although there were attempts during 2003 to extend it to nine-year primary education (3+3+3 system). This limit shift for one year was to emphasize the importance of general education for the internal developments of individuals as well as the quality of educating as many young people for the overall social progress. Considering the fact that it proved ineffective (for our country at this stage of social and school development), compulsory primary education was returned on eight years again.

Such education is realized through the school program by which we imply: all the contents, processes and activities aimed at achieving the objectives and outcomes of education, as prescribed and regulated both at the State (central) and the school (local) level. For these and similar definitions another term is also used, known to the pedagogic public as a curriculum. “Curriculum is usually consisted of studied subjects (Marsh J. Colin, 1994)”. The curriculum, in fact, represents comprehensive course of education. General education programs try to cover as many areas and they are often overloaded with complex contents and contents of secondary importance, because they do not take account of the knowledge economy instead of choosing basic facts and major ideas.

The curriculum in the primary general education in Serbia ought to include several components: it must involve system of knowledge, skills and habits of some areas of study (literature and language, art culture, an

understanding of nature and society, health and hygiene education), establishing the baseline for independent (individual) learning, ethic bases and lifestyle, emotional-valuable attitudes towards nature and other people. The personality of a child is being prepared through the adoption of the curriculum for the maintenance and culture development (in the broad sense). Therefore, the curriculum ought to originate from various sources in primary school already: science, technology, manufacturing, and culture, understanding nature, understanding people, pedagogical and psychological knowledge. In every respect, when choosing curriculum related to general education in primary schools one should not strive for maximum criterion (everything a child could acquire), he or she should examine how certain curriculum corresponds to certain age, what curriculum provides as a base for further development and what are the possible alternatives for its involvement in the teaching process.

GENERAL EDUCATION IN SECONDARY SCHOOLS

Secondary schools in Serbia (secondary education; среднее образоване) are post-primary schools of second level and they are consisted of "schools, institutions, forms and educational programs which are placed between primary and high education (Potkonjak, 1997)".

Secondary education in Serbia lasts two, three or four years and it is subsequently implemented in: general-educational secondary schools (gymnasium) that last four years; and secondary vocational schools (including art schools) that last two, three or four years (as required even more).

After the completion of general secondary education students take a general final exam which allows the transition to a higher level of education; and after the completion of secondary vocational education students are allowed to be involved in the work process or to move on a higher level of education. It is often said that general secondary education is the intersection of life, a gate through which one enters into the social and economic progress. It ought to prepare young people in order to engage themselves more easily in the mature period of life, i.e. to prepare themselves for their working (professional) activity. Thus, the common elements that make up the core (languages, natural sciences, general knowledge) ought to be enriched and modernized to reflect the increasing "globalization of the phenomenon, the need for intercultural understanding and science usage in promoting human development (Delor, 1996)". In other words, more attention should be paid on the quality and preparation for life in the rapidly changing world, in the world that is often prevailed by technology and high technique in all spheres of human activities. "Contemporary secondary general education is focused on the education of a humane person, … and it is necessary for future special (professional) man's preparation, for the man who is able to actively participate in communication and simultaneously aspires towards inner spiritual life, towards his attitudes management (Lihacev, 2000)". Namely, the period of development of young people who are involved in general secondary education, is one of the most turbulent and controversial period of personality development. "Secondary education convergence to the wider population of young people, in all countries with developed system of upbringing and education, and in our as well, asks questions of the construction of different models of secondary schools which regarding their contents, organization, technology and work forms satisfy individual needs and possibilities of the wider population of the Youth, but also the social objectives in the prospect of present and future (Potkonjak, 1988)". Additionally, the fact that the choice of future occupation is questioned in this period and therefore it plays a very complex role, which makes it an inseparable link of entire system of education. The right choice of profession, a choice of the right way is important because it "will allow us to maximally fulfill our working potentials and to satisfy our needs and desires (Minic, 2009)".

General secondary education is an integral part of the education system (particularly institutional) through which all the core issues, from primary (basic) to high education, are intertwined.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 19 ISSN 1309-6249

THE STRUCTURE OF GENERAL EDUCATION CONTENTS IN PRIMARY SCHOOLS

General education contents are very important because they ought to stimulate students, to encourage them to research, to ask relevant questions, to engage themselves in a process of creative studies in different areas within carefully selected and accurate data and information. General education contents must be flexible and, as such, they must prepare students for practical application. They must also take into account the effects of various changes to the growing multiplication of facts and data. This will require more involvement of novelty, and because of the fact that general education contents will have to change more and faster in response to newly discovered information and the extend of our knowledge in relation to which we decide what, how and how much should be changed. Since general and compulsory education is the beginning of a process of continuous and lifelong learning, and we are aware that it cannot provide the development of exactly everyone and just all knowledge, skills, attitudes and values necessary for active living in a community and the advance and progression on the individual plan, then it should develop the overall disposition, ability, openness and willingness to learn. For such process, it is necessary to provide adequate contents in the curriculum by which the said will be realized. In the curriculum conception, teaching and education are assumed as processes that affect the whole personality of a student. "A quality curriculum is one that, among the others, enables the harmonious development of all aspects of students' personalities (The Ministry of Education, 2003)".

Contemporary conception of teaching concept choice emphasizes the role of basic and essential knowledge required for all students. This knowledge is basic because it provides foundation that will be later supplemented and enriched with new and more complex knowledge, and essential because it provides effective learning in the social and cultural life, which is the right and need of every individual.

A curriculum is presently consisted of general and particular part and it presents a unique unit where general and particular parts are functionally adjusted to each other.

The general part in lower grades of compulsory primary education includes: primary (basic) subjects; compulsory subjects and optional subjects.

Higher grades of compulsory primary education include: primary subjects; compulsory subjects; and some optional subjects.

The particular part of a curriculum includes: optional courses, contents and activities through which schools, in accordance with their capabilities, satisfy the specific needs, benefits and interests of their students, parents and local community; and some optional subjects and facultative subjects, contents and activities through which schools, in accordance with their capabilities, satisfy the specific needs, benefits and interests of their students, parents and local community.

Subject teaching is done through: primary subjects (which are compulsory for every student in all grades of compulsory primary education); compulsory subjects (which are compulsory for every student in particular grades of primary education); optional subjects (which are compulsory for those students who choose them in particular grades); and facultative subjects (subjects which schools offer in a particular part of a curriculum and grade).

Today, there is a possibility of making differentiated curriculum for older students of primary schools which are designed for students with different interests, abilities and aspirations in individual subjects. "Since there are no conditions for "one student-one curriculum", experts opt for differentiated curriculum with three levels (elementary, intermediate and advance) (Kocic, 1984)".

Curricula at the earliest stage of primary education are accomplished through the class teaching where the focus in on the development of basic abilities, knowledge and skills. During this period, the process of systematic education relies on the experiences, knowledge and skills which a child has acquired and built up in other contents and conditions of daily pre-school and out of school life. In this part of education, teaching of primary, compulsory and optional subjects is accomplished within 90% of the prescribed number of classes. The remaining 10% is planned for the realization of the particular part of a school curriculum, which is also required.

At the next stage of primary education, children perform a large number of operations and they have various contextual knowledge. Abstract abilities and potentials, however, have not reached yet the level of full logical abstraction so the range of acknowledging is limited mostly on the concrete, realistic, material. Therefore, in the teaching process it is started with the phenomenon close to a child, conditions are made and the child is encouraged to explore them in different ways and to reveal them in new contexts and under various condition and thus he or she integrates all his or her new experiences into already known. During this period, the focus is on enriching and expanding and also integrating the already existing knowledge. In this part of education, teaching the primary, compulsory and some optional subjects is realized within 80% of the prescribed number of classes. The remaining 20% is planned for teaching some optional subjects and the school curriculum implementation, which is also required.

The final stage of primary education corresponds to the entrance of acknowledging abilities into the final, the most developed stage, i.e. forming abilities of abstract thinking. It allows the understanding and developing concepts and conceptual systems and managing the system of basic scientific knowledge. At this age, students are able to master the patterns of thought, research and problem solving specific to certain disciplines that will be later used in further studies. In this part of primary education, teaching the primary, compulsory and some optional subjects is realized within 70% of the prescribed number of classes. The remaining 30% is planned for teaching some optional subjects and the school curriculum implementation, which is also required.

Content areas of general education in primary schools in Serbia, are grouped in the following way: the Educational Area of Language, Literature and Communication; the Educational Area of Social Sciences and Philosophy; the Educational Area of Mathematics, Natural Science and Technology; the Educational Area of Art; the Educational Area of Physical Education and Health Education. *The Area of Language, Literature and Communication* is a very important part of general education. Knowledge in this area is acquired by native and foreign language, while one must have in mind that the knowledge acquired in this area represents the necessary basis for teaching and learning in other areas. When studying the language, it is important to acquire language skills: listening, speaking, writing, which are interconnected. Learning one skill helps learning the other etc. *The Educational Area of Social Science and Philosophy* provides knowledge and builds skills, attitudes and values required for the development of humane, tolerant, harmonious and intercultural oriented persons, who are capable of coping with complex conditions of a society, and capable of contributing the development of their community as a responsible citizen. By acknowledging the past and present societies, cultures and their diverse heritages, the student will notice the important phenomena and processes that influence the creation of man and society in different periods and places. He or she will simultaneously study: human's psychic life, the structure of though and knowledge, aspects of social and cultural interaction and communication, various forms of social communities and institutions, customs, norms, values and beliefs upon which they rely. *The Educational Area of Mathematics, Natural Science and Technology*: Mathematics, as a subject of general education, is essential to everyone. It is almost impossible to find an activity which does not require elementary mathematical knowledge and skills. Today's living conditions dictate such a situation that one cannot go anywhere without mathematical knowledge, not even outside the workplace. It is an integral element of all sciences and any business. Mathematics helps developing logical thinking, the perception of regularity and symmetry (which is essential while planning) and developing abilities to calculate, to estimate and logically respond. The study of nature, the diversity of elements in it, the parts it consists of, is a basis acquired in our

educational system in the lower grades of compulsory general education, the subject *the World around Us*. As regards technology, it should be noted that it is creative and practice oriented usage of human skills, in order to solve some various problems. It permeates our daily lives, both at home and workplace, so it is necessary that all students develop technological skills needed in the world they live. *The Educational Areas Art:* Arts offer a natural framework for unhindered research, research and communication. They have always had a great significance in communicating and understanding the world around us. As emotions, intellect and imagination are released through the art, their importance is enormous. *The Educational Area of Physical Education and Health Education* is also an important part of general education which implies that students acquire knowledge, abilities, skills and values necessary for the preservation and promotion of health and healthy lifestyles. The main objective of this area is to build up a proper attitude towards health. Physical activities cannot be replaceable or compensated for other area activities, which makes this area unique and certainly infallible component of quality general education. Varied and rich physical activities have stimulating effect on students. These activities should be well designed, they should include interesting, diverse and entertaining contents, which will create a favorable atmosphere and thus become their own aim, because they should really be a source of comfort and satisfaction for students.

The existence of these educational areas systematically establishes horizontal and vertical connection within the curriculum, by which: certain content repetition is avoided, it is allowed that related contents from a number of subjects are managed together (time-aligned) and the teaching content is adapted to the age characteristics and students' needs etc.

CONCLUDING REMARKS

Based on the presented, it can be concluded that the importance of general education is enormous. Suffice to say that general education knowledge has become the driving force for socio-economic and cultural development of each country. It comprehends all aspects of human life and work and influences the satisfaction of many human needs.

The compliance of general education with the development of science, engineering, technology, etc. is a social and pedagogical issue of a great importance. It is because, first of all, we live in an age dominated by turbulent changes such as: rapid development of science, informational engineering, microelectronics, robotics, etc. that change the role and importance of human factor in general. All these changes are the part of our general education and overall culture of every man.

General education in Serbia is present from the beginning to the end of schooling. In primary schools, it is done on the curriculum level whose structures must have the integrative character (structures covering the widest fields of human thought). The existence of these educational areas considerably facilitates educational work in primary schools, it has the stimulating effect on students and it is adaptable to their needs and age characteristics. General education in Serbia is now given special attention since its contents comprehend the widest fields of human thoughts; they enrich human life and contribute to the quality of personal and professional development.

IJONTE's Note: This article was presented at 3rd International Conference on New Trends in Education and Their Implications - ICONTE, 26-28 April, 2012, Antalya-Turkey and was selected for publication for Volume 3 Number 3 of IJONTE 2012 by IJONTE Scientific Committee.

International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 19 ISSN 1309-6249

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International Journal on New Trends in Education and Their Implications
July 2012 Volume: 3 Issue: 3 Article: 20 ISSN 1309-6249

CULTURAL TRACES ON THE RHETORICAL ORGANIZATION OF RESEARCH ARTICLE ABSTRACTS

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ABSTRACT

The main purpose of this study is to investigate to what extent there is a rhetorical variation (if there is any) between research article abstracts written by American academic writers and those written by Taiwanese, and Turkish academic writers in the area of social sciences. This study presents a contrastive analysis of 138 article abstracts (46 by American academic writers, 46 by Taiwanese academic writers, and 46 by Turkish academic writers) published in a refereed online journal 'Social Behavior and Personality'. The purpose of the study was to ascertain whether these article abstracts, which focus on the same issue but written by authors from different cultural and linguistic backgrounds and addressing audiences from different cultural and linguistic backgrounds, employed the same rhetorical strategies to introduce their works. For this purpose, the generic structures of these texts were analyzed. The analysis follows the Swalesian approach. The article abstracts seem to share a number of important rhetorical strategies. It appears that these abstracts conform closely to the M2–M3–M4 arrangement. On the whole, the rhetorical strategies shared by the groups in this section of the research articles outweigh the rhetorical strategies not so commonly employed. However, the abstracts written by Turkish speaking academic and Taiwanese speaking academic writers tend to underline their contribution to the field of study much further. Discussions and implications related to the findings will be presented in detail.

Key Words: Academic writing, research article abstracts, academic writers, and rhetorical strategy.

INTRODUCTION

The recent years have witnessed an influx of journals worldwide, aiming to disseminate the massive industry of knowledge with 'several million of research papers published every year' (Swales and Feak, 2009:1) and 'the online database SCOPUS, listing 16,000 peer reviewed journals and supplementing 600 new publications each year (Tse and Hyland, 2010:1881). Partly motivated by this need, and partly running parallel with status of English as an international language, especially for science and technology (Grabe & Kaplan, 1996; Johns & Dudley-Evans, 1991), the academic research article in English has become one of the fundamental, influential, and celebrated mediums of distributing and advancing scientific knowledge among scholars world-wide. This significant point has extended the axiom that 'no finding, discovery, or insight, according to Tse and Hyland (2010:1880), has any validity until it has gained peer approval through publication in a journal.' Considering the undeniable dominancy of English in article publication, over 95 % of publications in the *Science Citation Index* in 1995 were in English (van Leeuwen et al., 2001), the necessity for academic writers, both native and non-native speakers of English, to publish in English to get recognition of and appreciation by their discourse communities could easily be seen. Without doubt, this entails a good command of the discourse conventions that characterize scientific writing, as underlined by Bhatia (1997:313).

Since English has undoubtedly acquired the status of a world language, it is more than necessary that linguists of all persuasion, whether interested in the issue of language acquisition, description, use or reform need to

adjust their vision, paradigms, frameworks or methodologies in order to be able to account for this global variation in the use of English in the intra and international contexts.

Like native English speaking academic writers, non-native English speaking academic writers pursuing international recognition through publication unavoidably have to adopt academic writing, greatly shaped by Anglo American writing conventions. This necessity has led to numerous studies on the genre of the research article, which has garnered huge interest in the last decade. While some studies have been devoted to the more theoretical side of the issue, such as its historical development and social construction, some others have focused on the overall rhetorical structure and lexico-grammatical features of the research article. Studies on the rhetorical structure of the research article have mainly analyzed the different sections. Salager-Meyer (1990, 1992), Melander, Swales, & Frederickson (1997) Hyland (2000, 2004), Samraj (2005), and Swales and Feak (2009) investigated the research article abstract. However, the research article introduction has witnessed the lion's share from the researchers following the groundbreaking application of Swales' (1990) CARS model on the move structure of RA introductions. Swales (1990) and Swales & Najjar (1987) analyzed the research article introduction, while Thompson (1993), Brett (1994), and Williams (1999) focused on the results section and Hopkins & Dudley-Evans (1988) and Holmes (1997) studied the discussion section. In addition to studies focusing on the rhetorical structure of the research article, some researchers have focused on the lexico-grammatical features, such as identity (Tang and John, 1999), tense choice and transitivity (Martinez, 2001), citation practices (Hyland, 1999b) and (Harwood, 2009), authorial identity (Hyland, 2001, 2002), voice (Matsuda and Tardy, 2007). Yet some others have investigated the research article focusing on disciplinary variation (Nwogu, 1997; Anthony, 1999; Posteguillo, 1999; Samraj, 2002, Ozturk, 2007; Vázquez and Giner, 2008) and from a cross-linguistic/cultural perspective (Taylor and Chen, 1991; Hyland, 1998, 1999a, 2000; Mauranen, 1993; Luuka, 1994;; Valero-Garcés, 1996; Burgess, 1997; Moreno, 1997, 1998; Mur-Dueñas, 2007; Marin-Martin, 2008; Sheldon, 2009; Hu and Coa, 2011).

Although not as much as the other sections of the research article, the research article abstract has attracted interest and has become an important part of the research article, mostly motivated by the need to relieve researchers facing an information explosion. In stating the functions of the abstract, Huckin (2001) underlines its function serving as a mini-text, a screening-device, a preview, and as an index. Similarly, Bazerman (1984) underlines its representative function, while Swales (1990) foregrounds its distillation function, and Salager-Meyer (1990) underlines that it serves as crystallization for researchers and writers alike. As the abstract offers a clear guidance to readers in today's busy world flooded with information and indicates if the full article is worth reading, almost every journal requires an abstract preceding the main article (Martín-Martín, 2002). Even journals publishing articles in other languages require an abstract in English as well. Given this, it is a must for academic writers, let alone novice and non-native English speaking academic writers, to master the textual organization and linguistic realization of rhetorical moves of the abstract. Although a couple of studies by Salager-Meyer (1990, 1992), Kaplan et al. (1994), Santos (1996), Anderson and Maclean (1997), Hyland, 2004), Lorés (2004), Swales and Feak (2009) on the abstract have been conducted, no cross-cultural comparative study on the rhetorical structure of abstracts by native English speaking and non-native English speaking academic writers, especially including Turkish academic writers, have been conducted so far. Motivated by this need, this comparative study sets out to examine the rhetorical structure of research article abstracts written by American, Turkish and Taiwanese writers in English and published in an international scientific journal.

DATA AND METHODOLOGY

The construction of the corpus

To fill the above-mentioned gap, a total of 138 academic article abstracts published in the field of education in English were collected. The selection of the discipline was motivated by two considerations. Firstly, no study to date, with the same purpose and scope, of abstracts in English has been carried out, leaving an obvious lacuna to fill in. Secondly, it would be both necessary and feasible and practical to focus on a single discipline to tease

apart culturally motivated considerations away from disciplinary ones on the construction of the rhetorical organization of research article abstracts. Another important rationale behind focusing on only a single discipline lies in the findings of some earlier research. Previous studies on rhetorical organization have shown that disciplinary variations could have discernible influences on rhetorical structure and language use (Swales, 1990; Thompson, 1993; Nwogu, 1997; Posteguillo, 1999). Considering that the degree of uniformity of textual structures in scientific texts is highly dependent on the discipline to which they belong (Gnutzmann & Oldenburg, 1991), the researcher gathered the sample from texts belonging to only one discipline of experimental discipline of the experimental branch of social sciences: education.

The selection of the journal source was based on three criteria: indexed and abstracted in Social Sciences Citation Index, online availability, and occurring sufficient journals by writers from different languages and cultural backgrounds. Another rationale overshadowing the choice of one journal is related to the sometimes vague editorial directives which according to Hyland (2004:74) 'generally gives no guidance on creating a discursive context beyond the need to be 'informative' and 'succinct'". Selecting articles from different journals could complicate the already complex matter. As Social Behavior and Personality is a perfect match, this seemed an ideal ground to form the base of the research. Hence, the abstracts published in *Social Behavior and Personalit*y between 2000 and 2010 constituted the data of the study. The rationale behind choosing American academic writers is partly due to the fact that Anglo American rhetoric in academic writing has a huge impact worldwide, regardless of the language and cultural difference. It is also partly due to the availability of more articles by American academic writers compared to other native English speaking academic writers such as British, Canadian, Australian, or New Zealanders.

Considering that the rhetorical structure and linguistic features of empirical research articles can be very different from those of theoretical research articles, only abstracts of data-based research articles were included in the corpus. This study, which employs both qualitative and quantitative approaches, comprising frequency counts and text analysis of published research article abstracts, is based on three corpora of abstracts collected from one journal. The corpus in English by native speakers of American authors is made up of 46 research article abstracts selected at random among from 100 journal articles, the corpus in English by Turkish authors is made up of 46 research article abstracts selected at random among from 100 journal abstracts. Similarly, the corpus in English by Taiwanese writers consists of 46 research article abstracts selected randomly among from 100 research article abstracts from the same journal. The nationality of the native English speaking American authors, the native speaking Taiwanese academic writers, and the native Turkish speaking Turkish authors were based on information given in the bio-data sections of the authors accompanying the articles, their names, and affiliation.

Approach to the analysis of rhetorical structure/move structure

The structure of the research article abstracts was discussed in terms of the rhetorical moves or (communicative stages) of the research article; that is; introduction, purpose, methods, results, and discussion, resulting in four moves: purpose, methods, results, and conclusions, following Dudley-Evans (1986), Salager-Meyer (1990, 1991, 1992), Swales (1981, 1990), and Bhatia (1993). Santos (1996) proposes an additional move "situating the research", which typically appears at the beginning of abstracts and includes two moves: statement of current knowledge and statement of problem. Likewise, Hyland (2000) postulates an introduction move where the context of the study and its motivation are presented. In this study, the abstracts were analyzed the moves traditionally ascribed to abstracts as suggested by Hyland (2000) and Swales and Feak (2009) (Introduction, Purpose, Method, Results (product), Conclusion), which is quite similar to Hyland's (2000) classification. Other moves emerged from the data were also added to the classification. In the present study, the identification of moves is based solely on the function or content of the text (i.e. using a top-down approach). After the moves are identified, the typical linguistic features in each move are investigated. For inter-rater reliability, 20 randomly selected abstracts from the three corpora each were coded by two different people (the researcher and one university lecturer in linguistics and applied linguistics for the article abstracts

in English, high inter-rater reliability rates (over 90%) were obtained. In case of any discrepancies, which were rare, discussion sessions were held. Then the results were compared. Although the most common realization of moves was in a sentence, a move that was realized by structures ranging from several sentences to a phrase or a word was also accepted in this study.

Swales and Feak (2009)
Table 1: A classification of rhetorical moves in article abstracts

Moves	Typical Labels	Implied questions
Move 1	Background/introduction/situation. Why is the topic important?	What do we know about the topic?
Move 2	Present research/purpose	What is the study about?
Move 3	Methods/materials/subjects/procedures	How was it done?
Move 4	Results/findings	What was discovered?
Move 5	Discussion/conclusion/Implication/recommendations	What do the findings mean?

Approach to the analysis of the linguistic realization of moves

Following Pho (2008:235), the researcher himself analyzed the linguistic features of research article abstracts to help identify the linguistic features that could help distinguish the moves. The researcher also considered the linguistic features that previous studies of research article abstracts identified (Hyland, 1996, 2005; Kanoksilapatham, 2003; Vassileva, 2000, 2001).

FINDINGS

The macrostructure of abstract/Move Frequency

The great majority of the abstracts by the three groups of academic writers projected three to four moves. A closer look at the occurrence frequency of the moves in the corpus revealed that most of the abstracts included moves 2, 3, and 4. Namely, they contained the *Presenting the research* move, the *Summarizing the findings move* and the *Describing the methodology move* (Table 2).

Table 2: Patterns and percentages of occurrence of moves in the abstracts by the three groups

Moves	Number of abstracts by American academic writers	Number of abstracts by Turkish academic writers	Number of abstracts by Taiwanese academic writers
	N0 46 (%)	*N0 46 (%)*	*N0 46 (%)*
Introduction	17 (37%)	9 (8%)	15 (33%)
Purpose	46 (100%)	46 (100%)	46 (100%)
Method	45 (98%)	46 (100%)	42 (91%)
Results	46 (100%)	46 (100%)	45 (98%)
Conclusion	32 (70%)	16 (35%)	25 (54%)

As has been underlined earlier, the four basic structural components, which typically constitute an RA (P-M-R-C), were all present to some degree in the article abstracts. However, some similarities and also differences in the frequency of occurrence and distribution of these units in the three groups of abstracts were seen. The results in Table 2 show that the Results unit emerges as the most frequent and is an obligatory element in the three groups of abstracts. Similarly, the Purpose and Methods units are also quite similar in the two groups analyzed. Another common feature of the RA abstracts is that they included the Introduction unit the least, followed by the Conclusion unit. Regarding the divergences, it was found that Turkish and Taiwanese academic writers had fewer Conclusions and especially Introduction units than their American counterparts. Among

these departure is the Turkish academic writers' scarce employment of the Conclusion and notably Introduction units. It was also observed that the linear sequence, which these structural elements follow in the three groups of abstracts, is quite similar: Methods, Results, Purpose, Conclusion, and Introduction. When it comes to the number and percentages of the basic structural units, some variation was seen as could be sustained from table 3. It could be deduced from the information presented in the same table that abstracts by American academic writers look more complete than the abstracts by the two other groups in the sense that they contain the four basic units more. Over 62 % of abstracts by American academic writers include four moves, whereas only 34 % of abstracts by Turkish academic writers and 30 % of abstracts by Taiwanese academic writers experience four units. These two groups favored 3 units more when compared to their American counterparts.

Table 3: Number and percentages of structural units in the abstracts

Moves	Number of abstracts by American academic writers	Number of abstracts by Turkish academic writers	Number of abstracts by Taiwanese academic writers
	N0 46 (%)	*N0 46 (%)*	*N0 46 (%)*
5 Units	5 (11%)	1 (2%)	7(15%)
4 Units	31(67%)	17(37%)	15(33%)
3 Units	12(26%)	32(70%)	20(43%)
2 Units	---	---	6(13%)
1 Units	---	---	---

It might be of interest to further examine whether this inclination to omit one of the basic units is commonly favored by Turkish and Taiwanese academia in social sciences. The impact of abstracts with three or fewer units on the reader might also be worth investigating.

Description of the rhetorical moves

Description of the Background/Introduction/Situation unit

As three rhetorical moves, purpose, methods, and results units are the most frequently employed ones; the order of the description of the moves will not be based on their frequency of employment. In fact, they will be presented in the order as given in table 2. In the corpus of 150 research article abstracts, the Introduction move was the least frequent rhetorical move, which introduces the topic by either giving some background information or describing the situation. In so doing, this move helps the writer create a research space, which is problematic due to its various rhetorical options as is underlined by Swales. Swales (1990) bases the complexity of this move on two impositions on the writer: s/he has to decide on the amount and type of information to give and stance s/he has to take up. Maybe partly because of this complexity, this rhetorical move is the least employed one by all the groups. This move was realized mainly in two steps: making topic generalizations, reviewing items of previous research and, claiming centrality. Making topic generalization is the most common strategy followed by reviewing items of previous research, and claiming centrality.

People often judge the probability of two events occurring together to be more probable than the less probable of each of these events occurring separately, thereby demonstrating the conjunction error… (From an Abstract by an American writer)

This short topic generalization serves to set the scene for the reader, provides some background information, and also underlines the importance of the topic, all of which aim to capture the readers' attention and persuade her/him to continue reading the whole abstract. Another way of attracting readers' attention is through basing the study on some previous research as seen in the excerpt below. By basing the study on some

previous research, the writer shows that s/he is familiar with the relevant literature and is aware of the topic. Incorporated together, the writer claims insider credibility by demonstrating her disciplinary competence (Hyland, 2004).

…Previous research suggests many of the qualities necessary for successful well-being are masculine in nature… (From an Abstract by an American writer)

The other relatively infrequently employed rhetorical strategy is claiming centrality, which was in all occasions realized with an explicit word showing the significance of the issue. In excerpt below, the writer underscores the importance of the topic with the word 'increasing'.

…An increasing number of colleges and universities are focusing on general issues, thus presenting teachers with new challenges with regard to both pedagogy and expertise… (From an Abstract by a Taiwanese writer)

Description of the Present research/purpose rhetorical move

This rhetorical strategy, one the most common, was mostly realized through three steps: explicitly indicating the purpose of the study, explicitly stating what the study does, or describing the main features of the study. 47 % of the abstracts by American and Taiwanese writers, and 49 % of the abstracts by Turkish academic writers included this move. Turkish academic writers preferred to express their purpose using an explicit noun such as 'purpose', 'objective', and 'aim' (60 %), whereas American and Taiwanese academic writers showed a higher tendency to state what their studies did (60 % American academic writers and 52 % Taiwanese academic writers). Describing the main features of the study was found the least favored step.

The purpose of this study was to adapt the Self-Compassion Scale…into Turkish and test the validity and reliability of the measure… (From an Abstract by a Turkish writer)

In the realization of this step, the writers showed a preference for using deictics (the, this) to refer to the present text (paper, study, experiment), followed by a verb predominantly in the past tense, although instances of the present tense to a lesser degree were also found in all three groups of abstracts.

The aim of this study is to identify the body image and personality traits of male-to-female transsexual and homosexual persons in Turkey… (From an Abstract by a Turkish writer)

The other common way of this rhetorical move is describing what the study does/did as seen in the excerpt below. As is the case with the expression of purpose, the writers realized this move predominantly, using the past tense and chose verbs such as, 'investigate', 'discuss', 'describe' and 'analyze' to present their studies.

This study assessed the effects of behavior-setting changes, partners' behavior toward an interloper, and importance of interloper characteristics for romantic jealousy… (From an Abstract by an American writer)

In the great majority of the cases, all of the writers preferred their studies, research, or abstracts to speak for themselves. American academic writers foregrounded themselves in only 4 instances, while Taiwanese academic writers underlined their presence as writers in the abstracts in 6 instances. Regarding Turkish academic writers, they penned this only two times.

In this study we investigated whether the two motivational forces – social exchange and impression management – behind Organizational Citizenship Behavior (OCB) proposed by Bolino (1999) would be associated differently with an individual's OCB toward a coworker, supervisor, and organization… (From an Abstract by a Taiwanese writer)

Description of the methods/materials/subjects/procedures move

The frequency of occurrence of this move is quite similar in the abstracts of all the three groups. It occurred in 98 % of the abstracts by Turkish academic writers while it was seen in 90 % of abstracts by American writers

and 82 % of abstracts by Taiwanese academic writers. On the whole, the majority of this unit was very short, mostly consisting of one or two sentences aiming to describe briefly the most relevant details of this unit; subjects, materials, data sources, methods, and procedures. Abstracts by Turkish academic writers had relatively longer and more detailed rhetorical move than the other two groups, as seen in the excerpt below.

…The study sample includes 154 children (77 children with chronic illness, 77 children with acute illness). The data were collected via the General Information Form and the Piers-Harris Self-Concept Scale for Children (Piers & Harris, 1969). The data were analyzed via MANOVA, ANOVA and the Duncan Test… (From an Abstract by a Turkish writer)

As seen in this unit, the writer gives detailed information about the participants, data source and collection method, and how the data were analyzed. Another interesting point to note regarding this unit is that this rhetorical move occurred as a completely independent unit in most of the abstracts. Another point deserving mention here is that this move was characterized by the use of the past tense almost in all of the articles, and the passive voice to describe the methodology, indicating a preference for impersonal style, as seen below.

…The experimental children's group took part in project-based education for a total of 12 weeks while the control group followed the regular preschool curriculum. Data about the children's conceptual development were gathered using the Bracken Basic Concept Scale-Revised (Bracken, 1998), which was previously adapted for 6-year-old Turkish children by … (From an Abstract by a Turkish writer)

Description of the results/findings move

Similar to methods move, this rhetorical move is another most commonly employed one, present in all of the abstracts by American and Turkish academic writers and 90 % of the abstracts by Taiwanese academic writers. As writers could state their results or findings and make new knowledge claims by describing their main results and findings via this rhetorical move, it was seen that this move was an indispensable strategy for them. This move is characterized by the abundant use of sentence initial inanimate nouns such as 'the findings', 'the analyses', 'the results' etc. followed by verbs such as 'show', 'reveal', 'indicate', 'provide' demonstrate', etc. in the past tense, as seen in the below excerpt.

...Results showed that the factor structure of the Turkish version of the SELSA-S was largely similar to the original one. Finally, each subscale demonstrated high internal consistency, and as predicted was correlated with theoretically related loneliness measures and other relevant constructs, along with displaying temporal stability… (From an Abstract by a Turkish writer)

In this excerpt, the writer preferred an impersonal style. In some cases, writers' preference for an impersonal style was realized by a passive construction.

…For the former, it was found that: (i) antismoking advertising should intensively focus on escalating consumer risk perception and should be targeted toward males… (From an Abstract by a Taiwanese writer)

Contrary to predominant use of the past tense to report the results/findings of their studies, on some occasions, rare though they were, the writers preferred the present tense to realize the same goal. American writers used the present tense to describe their results on three occasions; Turkish academic writers preferred this tense on five occasions. On the other hand, Taiwanese academic writers used this tense for the same purpose 12 times.

…Our findings indicate that different dimensions of QWL result in distinctive effects on organizational and career commitments and turnover intentions… (From an Abstract by a Taiwanese writer)

Another rarely employed rhetorical strategy is the use of first person plural nouns to report the results. Taiwanese writers employed this strategy on five occasions while their Turkish counterparts used it just once. However, none of the American academic writers opted out for this strategy.

…We found that the more consistent the perception of HR practices between hairdressers and shop owners, the greater the employee affective commitment to the organization, emphasizing the value of HR practices in communicating clear and direct signals to employees regarding norms and expectations…(From an Abstract by a Taiwanese writer)

Description of the Discussion/conclusion move

In this rhetorical move of the data analyzed, the writers aimed to perform a couple of things from extending or interpreting the main results to drawing inferences, from pointing to applications to underlying wider implications. In so doing, it could ferry the reader from the text into the world by commenting on the implications of the research or its applications. Despite its crucial role in emphasizing 'the value of the paper either to the discipline or to the wider discourse community (Hyland (2004:74), this unit was employed as an optional extra, which is line with Hyland's (2004) study on the disciplinary differences in abstract structures.

This move is characterized by predominant use of the present tense. Almost all of the writers chose this tense to express their conclusions, initiating this unit by using an explicit noun. The two most commonly preferred words are 'findings' and 'results'. Typical verbs used are 'suggest', 'imply', 'indicate', and 'reveal'.

American academic writers used this move the most with 64 %, while their Taiwanese counterparts employed it by a lesser extent with 50 %. Contrary to these two groups, Turkish academic writers held it the least with 32 %. The most common purpose for employing this rhetorical move is extending and/or interpreting the results. American academic writers extended their results on nine occasions, while their Turkish counterparts engaged in it on ten occasions and Taiwanese academic writers did it on eight occasions. One of the most common purposes of employing this move is extending or interpreting the results as seen in the excerpt.

…Overall, the ratings of the different aged models were significantly correlated, all rs > .54, ps < .001, with high internal consistency, a = .89, demonstrating uniformity between attractiveness ratings at different ages. Also females rated the newborns as more attractive compared to the ratings by males, t(125) = 3.75, p < .001, d = .67. These results suggest that the perception of physical attractiveness is relatively stable in ratings of infants through to young adults, and females perceive infants to be more attractive than do male… (From an Abstract by a Taiwanese writer)

In this excerpt, the writer first reports the results and then interprets for the readers in the italicized part partly to underline the value of the study. Another goal this move serves is in expressing implications for the wider discourse community. American and Turkish academic writers underlined implications of their studies on seven and six occasions respectively, whereas their Taiwanese counterparts underscored their implications on ten occasions.

…Important findings were the differences in the statements by midwives and teachers about the roles of mothers, despite their similar definitions of motherhood. Mothers should support their motherhood needs in a number of ways as suggested in the discussion… (From an Abstract by a Taiwanese writer)

In the italicized part above, the writer underlines the implications of the study, which is generally characterized by the use of an epistemic modal verb and/or noun. Yet another motivation for employing this move is explicitly announcing the upcoming implication in the rest of the article. American academic writers announced their upcoming implications on ten occasions while their Taiwanese counterparts fulfilled it on four occasions. On the other hand, Turkish academic writers rendered it only once.

…Managerial implications for both researchers and practitioners are discussed. (From an Abstract by a Taiwanese writer)

The final reason for employing this rhetorical strategy is in making suggestions for future research, which was seen only in the abstracts by American and Taiwanese academic writers.

…Implications of these results for future research on group racial dynamics are considered. (From an Abstract by an American writer)

CONCLUSION

It is important to point out that the purpose of this exploratory study was to analyze whether article abstracts by authors from different cultural and linguistic backgrounds and addressing audiences from different cultural and linguistic backgrounds employed the same rhetorical strategies to introduce the works presented. To be more precise, it sought to investigate to what extent academic writers from different cultural and linguistic backgrounds adhere to rhetorical conventions of abstract writing. It is of course virtually impossible to make broad generalizations because of the relatively limited quantity of the data. Needless to say, much more data and research is needed to fully grasp this issue. Indeed, a full understanding of this matter is not easy because of the numerous factors influencing the issue. Although this study offers no finite explanation for the divergences from the native speaker academic conventions, the findings could hopefully give some insight into the issue.

Overall, this study has shown that the rhetorical structures of the abstracts by American, Turkish, and Taiwanese academic writers from culturally and linguistically diverse backgrounds generally reflect the Anglo American conventions of academic discourse community. A comprehensive analysis of these moves has revealed a certain degree of homogeneity among the groups. This conclusion is based on the fact that abstracts by these three groups employed the four basic rhetorical moves of the abstract. That is to say, they showed a clear preference for the use of Move 2 (Purpose), Move 3 (Method), and Move 4 (Results), which could be regarded as obligatory. Despite their diverse linguistic and cultural backgrounds, American academic writers, with an Anglo-American rhetorical background rooted in Socratic and Aristotelian philosophical traditions, with Taiwanese rhetorical norms with a pedigree in Confucian and Taoist traditions, and with Turkish rhetorical forms, have displayed the rhetorical conventions of abstract writing in their abstracts. This conclusion gains more significance given the very general instruction of the journal on the abstracts it requires.

However, some degree of divergence was discovered in the frequency of Move 1 (Introduction) and Move 5 (Conclusion). These two rhetorical moves were employed the least, which could be motivated by the fact that they are optional moves. In addition to being the least favored units, Turkish academic writers included them less than the other two groups, while American academic writers included them in their abstracts the most. This discrepancy could be due to a couple of factors ranging from different intellectual background and styles to cultural patterns, from the expectations of their discourse community to academic background to the influence of academic writing instruction. More contrastive analysis on this genre across different languages are needed to fully understand the influence of these factors on the writing practices of academic writers from different cultural and linguistic backgrounds.

Given the inadequacy of textbooks for novice writers as underlined by Ventola (1994) and the rather vague theoretical knowledge provided in the pages, it is a reality that such textbooks should base their advice on corpus-based research findings. With this gap at hand, we can easily say that the findings of this descriptive study have some pedagogical implications for academic writing materials developers and policy makers. In order to fully prepare graduate and postgraduate students for publication in their respective field worldwide,

rhetorical and linguistic conventions of research article writing could be incorporated into academic writing courses.

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