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Full Length Research Paper

Relationship between problem-solving style and mathematical literacy

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Currently, mathematics education is focused on ensuring that students can apply the knowledge and skills they learn to everyday life; students are expected to develop their problem-solving abilities to face challenges by adopting various perspectives. When faced with a problem, students may employ different methods or patterns to solve it. If this assertion is true, then how are the various types of problem-solving styles related to mathematical literacy? This survey was conducted to investigate this critical and noteworthy topic. Research data were obtained from the 2012 Programme test for International Student Assessment in Taiwan, taken by 15-year-old students. Latent class analysis (LCA), which is appropriate for identifying otherwise unobservable subgroups within a population, was conducted to determine how students respond to problem-solving scenarios and identify patterns of association in their problem-solving styles. The results of the LCA reveal that the 3-class model attained the best fit to the data. The students identified as independent group members attained the highest mathematical literacy, followed by those identified as resource-dependent group members and those identified as passive-dependent group members.

Key words: Mathematical literacy, latent class analysis, problem-solving style.

INTRODUCTION

Mathematics is a basic and critical foundation subject. From a formal educational perspective, mathematics is taught from first grade through high school. The purpose of learning mathematics may be to enter higher education or prepare for employment. From an informal education perspective, people first learn basic mathematics from family members for application in daily life before entering school; for example, learning the names of numbers and how to count and use money. Mathematics is not only learned in school but applied in activities of daily living; therefore, methods of connecting school mathematics and life has become a priority in designing school mathematics curricula.

In recent decades, problem-solving ability has been regarded as a critical aspect in mathematics education. In Taiwan, the Grade 1–9 Curriculum Guidelines for Mathematics states that the purpose of mathematics curricula is to cultivate students' abilities in commutating,

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abstracting, reasoning, and communicating, and students are expected to build mathematical foundations for their next stage of learning, learn to apply knowledge and skills to solve problems, and develop a healthy disposition toward mathematics (Taiwan Ministry of Education, 2003). The National Council of Teachers of Mathematics (NCTM, 2000) indicated that problem-solving ability is an integral part of all mathematics learning. In everyday life and in the workplace, the ability to resolve problems can yield considerable advantages. However, solving problems is not only a goal of learning mathematics but a major means of learning mathematical concepts. NCTM (2000) emphasized that instructional programs from prekindergarten through Grade 12 should enable students to build new mathematical knowledge through problem solving, thereby enabling them to solve problems that arise in mathematics and other contexts, apply and adapt various strategies to solving problems, and monitor and reflect on the process of mathematical problem solving. Trends in mathematics education indicate that students must develop various problem-solving strategies, and that such strategies require instructional attention if students are to learn them.

The Programme for International Student Assessment (PISA) test is a triennial international survey aimed at evaluating education systems worldwide by testing the skills and knowledge of 15-year-old students. Since 2000, students have been randomly selected from schools worldwide to sit tests in reading, mathematics, and science. The PISA mathematical literacy domain is concerned with evaluating students' capacities to analyze, reason, and communicate ideas effectively when posing, formulating, solving, and interpreting solutions to mathematical problems in various domains and situations. By focusing on real-world problems, the PISA is not limited to situations and problems typically encountered in school classrooms. Based on this type of assessment approach, problem-solving style would be a central role for mathematical literacy. The styles of problem solving suggest that systematic differences exist in individuals' natural or habitual pattern of acquiring and processing information in problem-solving situations. A core concept is that individuals differ in how they handle such problems. If this assertion is true, how are the various problem-solving styles related to the students' mathematical literacy?

Few studies have explored the relationship between problem-solving style and mathematical literacy. Furthermore, student attitudes toward problems may be a critical factor influencing their mathematical literacy. Hence, this topic warrants investigation.

Based on the aforementioned reasons, this study was conducted to identify 15-year-old Taiwanese students' patterns of problem solving and how these patterns are related to mathematical literacy.

LITERATURE REVIEW

Mathematical literacy

The PISA definition of mathematical literacy is as follows:

An individual's capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain and predict phenomena. It assists individuals in recognizing the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens. (Organisation for Economic Co-operation and Development [OECD], 2014a, p. 37).

Based on this definition, the PISA assessment approach differs considerably from those adopted by, for example, the Trend International Mathematics and Science Study (TIMSS), which is focused on what students have learned at school. The TIMSS test development process places considerable emphasis on covering the curricula of participating countries and uses a detailed scheme based on traditional curriculum content strands to describe national curricula. However, school mathematics is often offered to students as a strictly compartmentalized science, with a particular overemphasis on computation and formulas (OECD, 1999, p. 14). Although acquiring specific knowledge is critical in school learning, the PISA emphasizes that applying such knowledge in adult life depends crucially on an individual's acquisition of broader concepts and skills; in mathematics, reasoning quantitatively and representing relationships or dependencies are more critical than the ability to answer familiar textbook questions to the ability to deploy mathematical skills in everyday life. The metric for the overall mathematics scale is based on a mean for OECD countries of 500 points and a standard deviation of 100 points that were set in PISA 2003 when the first PISA mathematics scale was first developed.

To date, students representing more than 70 economies have participated in the PISA (OECD, 2015). The PISA tests are designed to assess the extent to which students, nearing the end of compulsory education, can apply their knowledge to real-life situations and are equipped to fully participate in society. The information collected through background questionnaires also provides context that can assist analysts in interpreting the results. The number of studies using PISA data to investigate critical educational issues is increasing. For example, Papanastasiou and Ferdig (2006) analyzed PISA 2003 data and showed that the different types of activities performed on computers are associated with different levels and types of thinking, which in turn are associated with distinct results. Chiu and Xihua (2008) examined how family and motivational

factors affect student achievements in mathematics across 41 countries by performing multilevel analyses, the results of which showed that students scored higher when living in more economically developed or egalitarian countries, with two parents, without grandparents, and with fewer siblings (particularly older siblings); when their family has a higher socioeconomic status, more books, more cultural possessions, or uses more diverse forms of cultural communication; or when they have greater interest in mathematics, exerted more effort, exhibited more perseverance, and demonstrated higher self-efficacy or self-concept.

The PISA is unique because the tests are not directly linked to school curricula. Students cannot learn everything in school that they will need to know in adult life. What they must acquire is the prerequisites for successful learning in future life. Such prerequisites are of both cognitive and motivational in nature. Students must develop the ability to organize and regulate their own learning, learn independently and in groups, and overcome difficulties in the learning process, which requires them to be aware of their own cognitive processes and learning strategies and methods; therefore, this study explored the relationship between problem-solving styles and mathematical literacy.

Problem solving

PISA 2012 measured students' capacity to respond to nonroutine situations to fulfill their potential as constructive and reflective citizens. In PISA 2012, problem-solving competency was defined as follows:

An individual's capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one's potential as a constructive and reflective citizen (OECD, 2014b, p.30).

The PISA 2012 test assessed individuals' problem-solving competency. A consistent research finding was that expert problem-solving ability depended on domain-specific knowledge and strategies (e.g. Mayer, 1992; Funke and Frensch, 2007; OECD, 2013, p. 120). To measure the cognitive processes fundamental to problem solving, the PISA 2012 problem-solving assessment avoided the need for expert knowledge as much as possible. This approach distinguished the assessment from problem-solving tasks in the core PISA literacy domains of reading, mathematics, and science, all of which incorporate expert knowledge in these areas.

The central feature of the PISA 2012 problem-solving assessment was that the problem situations were authentic and relatively complex—particularly those that require direct interaction by the student to uncover relevant information. Examples include problems commonly faced when using unfamiliar everyday devices such as remote controls, personal digital devices (e.g., mobile phones), home appliances, and vending machines. Problem-solving skills are necessary to attain more than a basic skill level when handling such situations; however, studies have indicated that more skills, in addition to those involved in traditional reasoning-based problem solving, are required (Klieme, 2004; OECD, 2013, p. 121).

METHOD

Data

The data used in this study were derived from the Taiwan data available from the PISA 2012 website. The PISA is administered triennially to a randomly selected group of 15-year-old students in the subjects of mathematics, reading, and science. At each assessment, one subject is given special focus. The area examined in this study is mathematical literacy because it was the subject that was emphasized in PISA 2012. Three forms (A, B, and C) of student questionnaire were designed to obtain broader and more comprehensive information about factors related to student performance, attitudes, and behaviors, and the functioning of education systems (e.g., demographic variables, previous educational career choices, instruction time, and class size). Therefore, not every student who participated in PISA 2012 responded to the scale of problem-solving experiences. After those who did not respond to the scale were excluded and the students whose data were complete were weighted to ensure that each sampled student appropriately represents the correct number of students in the full PISA population, 193,370 Taiwan students were enrolled in this study.

Problem-solving survey

The student questionnaire was administered after the literacy assessment and required approximately 30 min to complete. Problem-solving experience is one of the aspects in the student questionnaire. The PISA problem-solving experiences scale comprised five units, three situational units for specific situations such as "being unable to send text message from a mobile phone," "planning a trip to the zoo with your brother," and "buying a ticket from a machine that you have never used before," and four items for each unit. The PISA asks students to report whether they would *definitely do this*, *probably do this*, *probably not do this*, or *definitely not do this*.

This study used a latent class analysis (LCA) to explore the student problem-solving styles according to these three situational items. Problem-solving styles are consistent individual differences in the ways people prefer to handle new concepts, manage change, and respond effectively to complex open-ended opportunities and challenges.

Analysis methods

LCA was used to determine whether the criteria attained the best fit

Table 1. Summary of LCA criteria in each class model.

Model	AIC	BIC	Adjusted BIC	Entropy
2-class	43557.21	43714.512	43635.074	0.73
3-class	43274.73	43513.832	43393.085	0.71
4-class	43037.3	43358.209	43196.154	0.58

to a categorical model. To derive the optimal categories or problem-solving styles from the LCA, we viewed the responses definitely do this or probably do this as positive responses (coded as "1"), and the responses definitely not do this or probably not do this as a negative response (coded as "0").

LCA models associate observed categorical variables with latent categorical variables and identify a categorical latent class variable measured by numerous observed response variables. The objective is to categorize people into classes by using the observed items and identify the items that best distinguish between the classes. For LCA models with categorical outcomes, the item parameters correspond to the conditional item probabilities that are class-specific and provide information on the probability of an individual in a class endorsing an item. The class probability parameters specify the relative prevalence (size) of each class (Nylund et al., 2007, p. 539).

This study used Mplus software to perform the LCA and SPSS to perform the descriptive statistics and analysis of variance (ANOVA) for examining the mathematical literacy of students with different problem-solving styles.

RESULTS

Best-fit model of LCA

Currently, researchers apply a combination of criteria to guide decisions pertaining to the number of classes in LCA modeling. Such criteria include the Akaike information criterion (AIC), Bayesian information criterion (BIC), the adjusted BIC and entropy are widely used for model selection. The model with smaller AIC, BIC, and adjusted BIC values and a larger entropy value was the optimal choice.

The results in Table 1 indicate that two classes outperformed a single class and three or four classes was superior to two classes. The AIC, BIC, and adjusted BIC values were smaller for the four-class model, but the entropy was not good enough. The AIC, BIC, and adjusted BIC improved for each additional class, though substantial decreased existed between two and three classes and between three and four classes. The entropy was adequate for the two- and three-class models, but decreased noticeably for the four-class models.

The LCA results revealed that a three-class solution was the optimal fit, and we observed that the figure for the three-class solution was reasonable; therefore, we selected a three-class solution.

Table 2 and Figure 1 present the students' probabilities in each category for the individual indicators. The conditional probability for Class 1 students responded for Item 1 in Situation A is 0.893, implying an 89.3% probability of Class 1 students responding positively to the item "I press every button possible to find out what is wrong."

We can use the probability in each category for individual indicators to assign a meaningful label to each class. The largest class (Class 3, 79%) of students used various resources, whether human or written information. According to the characteristics of these students, Class 3 was termed the "resource-dependent group."

The middle class (Class 1, 12%) favored solving problems independently. These students were more willing to try new things and less afraid of making errors than the other two groups were; therefore, we named Class 1 the "independent group."

The students in the smallest class (Class 2, 9%) were less likely to actively solve problems they encountered and tended to rely on people around them to assist them in solving problems; therefore, this group was named the "passive-dependent group."

Mathematical literacy according to problem-solving style

Particularly noteworthy results of this study were the problem-solving styles derived from the LCA. Table 3 shows the descriptive statistics of mathematical literacy for the three classes of problem solving. The means of three types indicate that the independent group attained the highest level of mathematical literacy (M=596.01), followed by the resource-dependent group, and then the passive-dependent group. One-way ANOVA was then conducted to investigate the relationship between the latent classes and mathematical literacy by conducting a mean difference test across the classes. The results in Table 4 show that the mean difference test across the classes was statistically significant (F=5034.59, p<.01). The measure of association strength η^2 was 4.9%, implying that the problem-solving styles accounted for approximately 5% of the variance in mathematical literacy. The results of a post hoc test indicate that the students who solved problems independently attained significantly higher scores than did those in the resource-

Table 2. Conditional probabilities of each item and latent class probability on the problem-solving scale for 3-class model.

Situation	item	Class 1	Class 2	Class 3
A. Suppose that you have been sending text messages from your mobile phone for several weeks. Today, however, you can't send text messages. You want to try to solve the problem.	1. I press every button possible to find out what is wrong.	0.893	0.408	0.889
	2. I think about what might have caused the problem and what I can do to solve it.	0.994	0.439	0.967
	3. I read the manual.	0.495	0.246	0.759
	4. I ask a friend for help.	0.643	0.661	0.937
B. Suppose that you are planning a trip to the zoo with your brother. You don't know which route to take to get there	1. I read the zoo brochure to see if it says how to get there.	0.891	0.577	0.974
	2. I study a map and work out the best route.	0.806	0.494	0.907
	3. I leave it to my brother to worry about how to get there.	0.296	0.428	0.331
	4. I know roughly where it is, so I suggest we just start driving.	0.535	0.456	0.59
C. Suppose that you arrive at the train station. There is a ticket machine that you have never used before. You want to buy a ticket.	1. I check how similar it is to other ticket machines I have used.	0.911	0.54	0.921
	2. I try out all the buttons to see what happens.	0.481	0.328	0.319
	3. I ask someone for help.	0.275	0.609	0.894
	4. I try to find a ticket office at the station to buy a ticket.	0.668	0.746	0.969
Class Probability		0.12	0.09	0.79
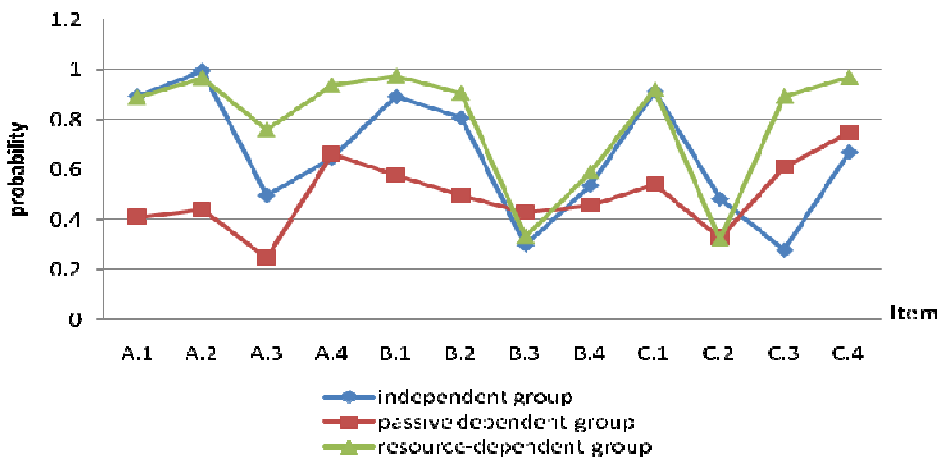
Figure 1. Distribution of conditional probabilities of each item for 3-class model.

and passive-dependent groups, and that the resource-dependent group solved problems more effectively than did the passive-dependent group.

The results of this study demonstrate that students use different problem-solving styles, and the three styles identified in this study can be considered three types of attitude toward solving problems. Ma and Kishor (1997) conducted a meta-analysis to investigate the positive relationship between attitude toward mathematics and achievement in mathematics. The present study found that problem-solving style plays an important role in mathematical literacy.

Table 3. Descriptive statistics of mathematical literacy for the three classes of problem solving.

Type	N	Mean	SD
independent group	24087	596.01	108.28
passive dependent group	16288	484.12	123.51
resource-dependent group	152995	563.52	111.59

Table 4. ANOVA Results of Mathematical Literacy for Different Problem-Solving Types.

Source	SS	df	MS	F	p	η^2
Between	126869944.16	2	63434972.08	5034.59	0.000	.049
Within	2435871759.59	193367	12597.14			
Total	63393722894.71	193370				

Conclusion

Students cannot learn everything in school that they will need to know in adult life. Therefore, understanding the patterns of problem solving and how they are related to literacy can assist most educators in designing tailored interventions targeting the subgroups of different problem-solving style. In this study, data from the Taiwan PISA 2012 survey and LCA revealed that the three-class model attained the optimal fit to the students' problem-solving styles. The three problem-solving styles were termed "independent," "passive dependent," and "resource dependent." The results of a mean difference test indicate that the average mathematical literacy of the independent group was the highest, followed by the resource-dependent group and passive-dependent group. The mean difference in mathematical literacy scores between the highest and lowest groups was approximately 110, which is nearly one standard deviation for Taiwan. The mean difference in score between the resource- and passive-dependent groups was approximately 80. Overall, the mathematical literacy of the passive-dependent group was considerably lower than that of the two other groups. Hence, students who do not adopt an active problem-solving attitude have poorer mathematical literacy than do those who adopt an active problem-solving attitude. The three groups exhibited distinct attitudes toward problem solving; educators could further understand each group's characteristics according to their conditional probabilities, and educators could design effective instructions to improve student attitudes according to the advantages and disadvantages of the group students are in. Both the resource- and passive-dependent groups tended to seek assistance from others, though the resource-dependent group was more active in solving problems compared with the passive-dependent group. Educators could encourage and assist passive-dependent students in fostering a positive attitude toward solving problems.

The average mathematical literacy score of the independent group was approximately 33 points higher than that of the resource-dependent group. Many similar tendencies existed in the responses of these two groups. However, the independent group tended to think independently, use their own knowledge and skills to solve problems, and was more tolerant of adopting a trial-and-error approach. Thus, this study suggests that educators should encourage resource-dependent learners to engage actively in problem-solving activities and exploit available resources—more importantly, they should encourage these students to attempt to solve problems by themselves.

Identifying the problem-solving styles of students as a basis for providing responsive instruction has never been more critical, with educators increasingly expected to promote their students' mathematics performance effectively. If instruction can help students to adopt effective problem-solving orientation, the students will be able to achieve higher levels of performance and with a more positive attitude towards learning while learning difficult subjects.

This study investigated 15-year-old students from Grades 9 and 10; future research should consider investigating the differences in problem-solving skills between Grade 9 and 10 students or between girls and boys, thereby obtaining a more comprehensive understanding of 15-year-old students' attitudes toward solving problems.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Development of metacognitive skills: designing problem-based experiment with prospective science teachers in biology laboratory

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The purpose of this study is to investigate the effect of designing problem-based experiments (DPBE) on the level of metacognitive skills of prospective science teachers. For this purpose, pre test-post test design, without control group, was used in the research. The research group of the study comprised 113 second-grade prospective science teachers who studied at the Faculty of Education of a state university, which is in the west of Turkey, in 2011-2012 spring semester. DPBE practices were carried out under the course of biology laboratory II. The experimental study was continued for 10 weeks. In the research, Metacognitive Skills Test for Adults which consists of 52 items and 2 factors was used for data collection. Cronbach's alpha coefficient of the test was 0.95. In the analysis of data, related samples T-test and unrelated sample T-test were used via SPSS-21. As a result of analyzing the data, it has been concluded that designing problem-based experiments contributes positively to the development of metacognitive skills and being aware of cognitive features, which are the sub-factors of the scale, of prospective science teachers. Besides, while metacognitive pre-test scores do not show any difference according to gender, post-test scores indicate a significant difference in favor of females.

Key words: Biology laboratory, designing experiment, metacognitive, problem-based learning, prospective science teacher.

INTRODUCTION

Raising individuals who think and who can produce new knowledge and technology is one of the primary goals of education. Considering that knowledge does not exist independent of the knowing and the knowing forms of his learning processes by thinking, the knowledge of individuals regarding their thinking process and strategies and their abilities to monitor and organize these pro-

cesses become important. This process which is called metacognition requires students to analyze, think and monitor their own thinking and learning. In the process of designing problem based experiments students also need to use their metacognitive skills. Gunstone and Northfield (1994) claimed that metacognitive education needs to be at the center of education of teachers.

Many researches stated that metacognition is important in efficient problem solving (Goos and Galbraith, 1996; Wilson, 1999).

Problem solving ability is described as an interaction between cognition and metacognition (Artzt and Thomas, 1992). Metacognitive processes are required to successfully carry out any complex problem solving task. The better the individuals control and monitor the strategies they use the more their problem solving ability improves (Swanson, 1992). Cornoldi (1998) emphasized the role of the faiths of learners in thinking and stated that if students feel safe, they can solve problems and they tend to do better things. Metacognition is described as the knowledge of an individual's cognitive processes and awareness in solving a problem and it involves the processes of planning, monitoring and evaluating the solution of a problem (Flavell, 1992; O'Neil and Abedi, 1996). The use of metacognitive processes helps individuals work through in problem solving and improves their ability to achieve their goals (Fortunato et al., 1991). An individual who has the ability of efficient problem solving focuses his attention to understand the relations between the factors of the problem, checks if the solutions is correct by himself, divides complex problems into simple steps, creates internal and external designs for the problem and asks and answers questions by himself to clarify his thoughts (Descartes, 2008; Gourgey, 1998). Researches have shown that monitoring and controlling the metacognition are important skills for successful problem solving (Artzt and Thomas, 1992). Also, researches have proved that metacognitive skills predict the ability of problem solving (Swanson, 1990).

Metacognitive awareness is, briefly, thinking about thinking (Flavell, 1987). Metacognition is individual's awareness on his own thinking processes and his being able to control these processes (Hacker and Dunlosky, 2003; Jager et al., 2005; Özsoy, 2008). Hacker (1998) described metacognition as the knowledge of individual's knowledge, processes, cognitive and emotional status and as monitoring and organizing these statuses with a goal. Metacognition is the evaluation of individual's knowledge and in this evaluation, it is important to comprehend the learning tasks and what kind of information and skills are required for it. Also, it needs to be integrated with the individual's ability of correctly deducing how he will apply for his strategic knowledge in a given situation and how he will use this strategy in an efficient and safe way (Taylor, 1999). Metacognition is usually related to student's knowledge of learning processes, his awareness and control (Brown, 1987; Garner and Alexander, 1989). A person who has metacognitive skills is thought to be someone who is equipped with the ability of being aware of current opinions, evaluating them and knowing the situations when it is necessary to

rearrange them. As metacognition develops with regard to individual's foreknowledge and ability of learning how to learn, it is considered a high level learning skill. The constant change in the rapidly growing technology makes it difficult to comprehend what knowledge will be more important in the future as well as making it impossible to acquire all the knowledge. It is quite significant that individuals are aware of cognitive structure and learning features (Akın, 2006). Metacognition which explains this awareness could be said to describe thinking about thinking, knowing what we know or not know, the awareness of the different aspects of thinking (Namlu, 2004). Metacognition with regards to learning processes involves using and controlling the cognitive functions consciously (Cornoldi and Lucangeli, 1996). According to Bradshaw (2000), metacognition is high level questions that have the ability to activate low level knowledge. Metacognition is a person's realizing his own cognitive processes and taking part in controlling and enhancing these processes rather than the content of cognitive processes (Biggs and Moore, 1993). Metacognition in an overall approach is a structure that involves a person being aware of the events and functions in his own mind and directing mind events and their functions with a goal (Dienes and Perner, 1999).

Researches on metacognition have been conducted in the light of the fact that a functional cognitive system not only learns and acts but also knows how to do it and how to do it better (Lucangeli and Cornoldi, 1997).

In Turkey, when investigated the researches regarding science education and metacognition, it is viewed that scale development and adaptation researches (Aktamış and Uça, 2010; Aydın and Ubuz, 2010; Yıldız et al., 2009), conducted to determine the levels of metacognitive awareness (Evran and Yurdabakan, 2013), researches conducted to find out if metacognitive skill develop by the use of various teaching methods (Aydın and Kaptan, 2014; Tonbuloğlu, Aslan et al., 2013). There have been researches regarding that self and peer assessment activities of cooperative learning method affects the levels of cognitive awareness of students positively (Shamir et al., 2008; Papinczak et al., 2007). Özkan (2007) suggested that there is a positively signicificant relation between teachers' using learning strategies and metacognitive skills while learning and their using strategies that improve metacognitive skills in their classes.

A problem is a situation that subjects an individual to the need of making a decision to choose the method he can use in problem solving. This might be a life problem or a problem in a scientific field. Metacognition is defined as a key concept in the process of problem solving (Hartman, 1998). There is a common idea regarding that metacognitive skills determine an individual's success or

failure in problem solving. Cardelle-Elawar (1995) provided metacognitive strategy training for students with low level of achievement and observed the effects of the training on the performance of the students. The researcher reported that students who have low level of achievement but who had the training for monitoring and controlling metacognitive processes are better in problem solving than students who did not have the training. In a research, Swanson (1990) suggested that students with high level of metaconigitive skills show better performance in problem solving than those with low level of metacognitive skills. Thus, he deduced that high performance in problem solving tasks has a closer relationship with metacognitive skills rather than all other skills. In the process, students struggle to define the problem, elaborate the ideas they get from various sources and to evaluate the procedures and all of these are metacognitive activities (McGregor, 2007). Kapa (2001) inferred that learning environments which give metacognitive support in each step of problem solving process are significantly more productive than learning environments which give metacognitive support only at the end of the solving process. According to Schoenfeld (1985), these skills are the basic elements to determine the success or failure of an individual in problem solving and students need to be explicitly trained to monitor their metacognitive processes in problem solving process. When an expert problem solver is asked to categorize science problems, he categorizes them with regard to the scientific law underlying these problems. Likewise, students with high competence categorize science problems with regard to the underlying concept while students with low competence fall into complexity due to superficial features that lead them to wrong solution strategies. Misdescription of the problem inevitably leads to wrong solutions, and cognitive and metacognitive problems occur since both the students are on the wrong track due to incorrect conceptualization of the problem and they fail to comprehend that they are wrong (Silver, 1987). One of the methods that can improve problem solving skills of individuals is problem-based learning.

Problem-based learning might be considered as a small group learning method that combines improving general abilities and acquisition of knowledge (Awang and Ramly, 2008). Problem-based learning uses real life problems as content in order for students to gain the abilities of critical thinking and problem solving (Alper, 2008). In PBL problems which take place in real life are presented to students in intriguing scenarios. A scenario should spark students' interest in a subject (Dahlgren and Öberg, 2001). PBL might be regarded, at least in theory, ideally suitable for the development of the level of metacognition of university students (Downing et al., 2009). PBL process can improve the students' skills such

as problem solving, researching and critical thinking, cooperative learning, self learning and lifelong learning (Herron and Major, 2004; Fen-Lin et al., 2010). Teachers should let students take responsibility, encourage them to be free, remain in the back ground (Liceaga et al., 2011).

Considering the studies conducted on PBL in Turkey, there have been researches conducted on the applicability of problem-based learning into science teaching (Şenocak and Taşkesenligil, 2005), researches conducted to determine its effect on the problem solving skills and self-efficacy belief levels of prospective teachers (Altunçekiç et al., 2005; Yaman and Yalçın, 2005), its effect on motivation (Tosun and Taşkesenligil, 2012), its effect on success (İnel and Balım, 2010a; Serin, 2009; Tarhan and Acar, 2007; Şenocak et al., 2007), its effect on perception of self efficacy (Gürlen, 2011) and researches conducted to determine the opinion of students on PBL (İnel and Balım, 2010b).

Examining the researches conducted on the effect of problem-based learning on metacognitive skills; Demirel and Turan (2010) determined that problem-based learning applications in science class increase the meta-cognitive awareness of sixth graders. In their studies, Downing et al. (2009) deduced that problem-based learning significantly affect the metacognitive skills of university students. Haryani et al. (2012), in their studies found out that problem-based learning applications in analytical chemistry classes improves metacognitive skills of prospective teachers. Tosun and Şenocak (2013) suggested that problem-based learning applications in chemistry classes of prospective teachers with different scientific background increase metacognitive awareness.

The present study

It is considered to be important that prospective teachers who will raise the students of the future are aware of their own thinking processes and they can control these processes. Teachers who are aware of their metacognitive skills are more successful in using strategies that improve the metacognitive skills of the students (İmel, 2002; Özkan, 2007). As prospective teachers' having metacognitive skills provides them to better know and to control their own cognitive skills it will get easy to teach these features to students at schools. When considered from this point of view, it is important that methods and techniques which are directed to improve the metacognitive skills of prospective teachers are used. Therefore, initially, it is necessary to determine the methods that improve metacognitive skills. Thus, the following questions are to be answered:

1. Does designing problem-based experiments in a biology lab course have any effect on metacognitive skills

of prospective science teachers?
2. Do metacognitive pre test-post test scores of prospective science teachers show difference according to gender?

METHODOLOGY

Research design

In the study, pre test-post test design without control group was used. In this design, the effect of the experimental procedure is tested on a single group and the measurements of the subjects regarding the dependent variable are acquired via pre test before the application and post test after the application by using the same subjects and the same assessment instrument. There is no randomness and matching and in this regard, the design can be described as single factorial between-groups or repetitive measuring design. In the design, the significance of the difference between pre test and post test (O1, O2) of the single group (G). (Büyüköztürk et al., 2008).

Study group

The research group of the study comprised 113 second-grade prospective science teachers who studied at the Faculty of Education of a state university, which is in the west of Turkey, in 2011-2012 spring semester. These are prospective teachers who take Biology Lab II course which has 4 classes in daytime education and 2 classes in nighttime education, 6 classes in total. Biology lab is a compulsory subject for science teaching. There is a Biology Lab I (2 credits) in fall semester of second grade and Biology Lab II (2 credits) in spring semester as an applied course. Examining the gender distribution of the prospective teachers, 82(61.7%) of them are females and 31(23.3%) of them are males.

Assessment ınstrument

As part of the research, to determine the metacognitive skills of prospective science teachers, "Metacognitive Skill For Adults" test which Scraw and Dennison (1994) designed for adults was used. Turkish version of "Metacognitive Skill Test For Adults" was adapted by Özcan (2007) and the measurement Cronbach alpha coefficient of the scale was found 0.95. The scale which has two sub-dimensions, one of which is being aware of metacognitive skills sub dimension including 17 questions, and the other which is cognitive skills sub dimension including 35 questions and the test consists of 52 questions in total.

Experimental procedure

The research was conducted with second grade prospective science teachers who take Biology Lab II course in 4 daytime classes and 2 nighttime classes in a faculty of education. Before and after the experimental procedure a Metacognitive Skill Test was done on the experiment group. The experimental study was continued for 10 weeks. Study cards with regard to problem-based learning were used in the groups. In the activity cards, there were 14 real life scenarios that would excite the attention of the students and would arouse their interest and would provide them to research and query. One or two scenarios were given to the prospective

teachers as relevant to the subject. Prospective teachers who studied cooperatively in groups of 5-6 people read the scenario they were given beforehand and discussed the questions "What is the problem (or problems) to be addressed in the scenario? What do we know about this subject?" Until the next lesson, they reported their researches regarding the subject and designed experiments that could present the subject of the scenario. During the second week they conducted the experiments they designed and filled out peer and self-assessment forms with regard to the process. After this process, scenarios for the following week were provided and they made discussions again in groups. From the very beginnig of the process, it was aimed to provide them the opportunity to do research on the subject and return with as many resources as possible by telling the prospective teachers the main theme of the next week. Prospective teachers designed experiments with regard to the problems in the scenarios and conducted the experiments they designed for 10 weeks. Herein below one out of 14 scenarios distributed to the prospective teachers are given as example.

Scenario 1: Her father bought fish for Merve and her sister as present. Merve put her fish on the table near the heater in the kitchen while her sister put hers in the balcony. After awhile of observation they saw that their gill movements were different. Although the size of the fishbowl and the amount of the water were the same, they wondered why it happened.

During the applications, no change was made in the weekly lesson schedule of Biology Laboratory II and it was carried out two hours a week.

Data analysis

The data were analyzed via SPSS 21 packet program. To examine the normal distribution range, p value of Kolmogorov-Smirnov test was found as 0.20. Since the values found higher than 0.05 were interpreted as suitable, not showing deviance from normal distribution on this significance level (Büyüköztürk, 2007), related samples T-test and unrelated sample T-test were used in data analysis. In addition, effect sizes were measured to determine how much of the test score variant depends on the independent variable or group variable. Büyüköztürk et al. (2008) suggested that η^2 (et square) value varies between 0, 00 and 100 and 0, 01 is interpreted as small effect size, 0, 06 as middle effect size and 0, 14 as big effect size. He stated that d which is the value of effect size, can take values between +infinite and - infinite, and it is interpreted, regardles of its sign, 0,2 as small effect size, 0,5 as middle effect size and 0,8 as big effect size (Büyüköztürk, 2007; Erika, 2006).

FINDINGS

T-test results conducted on the significance of the difference between pre test and post test average scores of metacognitive skill test are given in Table 1.

As a result of prospective teachers' designing problem-based experiments there has been found significant increase in their metacognitive skills [t $_{(112)}$ =6.00, p<.01]. While the metacognitive skill average of prospective teachers was $\overline{X}$=196, 35 before the application, after the application of designing problem-based experiments it has increased to $\overline{X}$=208, 59. This finding has shown that designing problem-based experiments has an important effect on increasing the metacognitive skills of

Table 1. T-test results of pre test post test for metacognitive skill test total score.

Measurement	N	Mean	S	sd	t	p
Pre test	113	196,35	18,45	112	6,00	.000
Post test	113	208,59	23,39			

prospective teachers. Also, Cohen d value which is calculated to determine effect value has been found 0, 56 and η^2 (et square) value has been found 0, 24. Therefore, it can be said that the difference between the means is 0.56 standard deviation, 24% of the variant that belongs to the metacognitive skill scores show up depending on the pre test post test, namely measurement. Measured effect sizes reflect a wide effect.

T-test results conducted on the significance of the difference between pre test and post test average scores for metacognitive skill test sub dimension of being aware of cognitive features are shown in Table 2.

As a result of prospective teachers' designing problem-based experiments there has been found an increase in the sub dimension of being aware of cognitive features [t $_{(112)}$ =4.74, p<.01]. The mean for being aware of cognitive features of prospective teachers before the application was $\overline{X}$=66, 42, after the application of designing problem-based experiments, it increased to $\overline{X}$=69, 69. This finding can be interpreted as that designing problem-based experiments has a significant effect on the increase of prospective teachers' being aware of cognitive features of their metacognitive skills. Cohen d value which is calculated to determine effect value has been found 0, 45 and η^2 (et square) value is found 0, 16. Therefore, it can be said that the difference between the means is 0,45 standard deviation, 16% of the variant that belongs to the metacognitive skill test sub dimension of being aware of cognitive features scores show up depending on the pre test post test, namely measurement. Measured effect sizes reflect a wide effect.

T-test results conducted on the significance of the difference between pre test and post test average scores for metacognitive skill test sub dimension of organizing cognitive skills are given in Table 3.

As a result of prospective teachers' designing problem-based experiments there has been found an increase in metacognitive skill test sub dimension of organizing cognitive skills [t $_{(112)}$=6,16, p<.01]. The mean for organizing cognitive skills of prospective teachers before the application was $\overline{X}$=129,942, after the application of designing problem-based experiments, it increased to $\overline{X}$=1389. This finding can be interpreted as that designing problem-based experiments has a significant effect on the increase of prospective teachers' organizing cognitive skills. Cohen d value which is calculated to determine

effect value has been found 0, 58 and η^2 (et square) value is found 0, 25. Therefore, it can be said that the difference between the means is 0,58 standard deviation, 25% of the variant that belongs to the metacognitive skill test sub dimension of organizing cognitive skills scores show up depending on the pre test post test, namely measurement. Measured effect sizes reflect a wide effect.

Prospective teachers' T-test results of pre test scores for metacognitive skill test according to gender are given in Table 4.

Examining Table 4, prospective teachers' pre test metacognitive score mean hasn't shown significant difference according to gender [t $_{(111)}$ =1, 94, p>.01]. While the metacognitive pre test mean of females was $\overline{X}$=198, 40 males' was $\overline{X}$=190, 93. Cohen d value which is calculated to determine effect value has been found 0,61 and η^2 (et square) value is found 0,071. Therefore, it can be said that the difference between the means is 0,61 standard deviation, 7% of the variant that belongs to the metacognitive skill test scores show up depending on gender. Measured effect sizes reflect a middle effect.

Prospective teachers' T-test results of pre test scores for metacognitive skill test according to gender are given in Table 5.

Prospective teachers' post test metacognitive score mean has shown difference according to gender in favor of females [t $_{(111)}$ =2, 93, p<.01]. While the metacognitive post test mean of females was $\overline{X}$=212, 43 males was $\overline{X}$=198, 41. This finding can be interpreted as that designing problem-based experiments has more effect on the development of metacognitive skills of females prospective teachers than that of males.

In Figure 1 it stands out that the increase in the metacognitive skill scores of females is bigger than that of males.

RESULTS AND DISCUSSION

1. In this research, firstly the effect of designing problem-based experiments (DPBE) on the level of metacognitive skills of prospective science teachers in biology lab course were analyzed.

Examining the findings of this study which aims at determining the effect of designing problem-based experiments in biology lab course on the metacognitive skills of prospective science teachers, at the end of the process of designing problem-based experiments, there has been an significant increase in metacognitive skills of prospective teachers, their metacognitive skill sub dimension of being aware of cognitive features and sub dimension of organizing cognitive skills. Likewise, Haryani et al. (2012) determined that open-ended laboratory applications in analytical chemistry course

Table 2. T-test results of pre test post test for metacognitive skill test sub dimension of being aware of cognitive features.

Measurement	N	Mean	S	sd	t	p
Pre test for Being Aware of Cognitive Features	113	66,42	6,37	112	4,74	.000
Post test for Being Aware of Cognitive Features	113	69,69	7,92			

Table 3. T-test results of pre test post test for metacognitive skill test sub dimension of organizing cognitive skills.

Measurement	N	Mean	S	sd	t	p
Organizing Cognitive Skills Pre test	113	129,92	13,24	112	6,16	.000
Organizing Cognitive Skills Post test	113	138,89	16,18			

Table 4. T-test results of pre test scores for metacognitive skill test according to gender.

Gender	N	Mean	S	sd	t	p
Female	82	198,40	17,90	111	1,94	.055
Male	31	190,93	19,07			

Table 5. T-test results of post test scores for metacognitive skill test according to gender.

Gender	N	Mean	S	sd	t	p
Female	82	212,43	19,85	111	2,93	.004
Male	31	198,41	28,85			

Figure 1. Pre test- post test mean of metacognitive skills according to gender.

improve metacognitive skill of prospective teachers. Downing et al. (2009) deduced in their studies that problem-based learning significantly improves the metacognitive skills of university students.

In the process, while identifying the problems in the scenarios and designing experiments related to the problem prospective teachers had to be aware of their cognitive features and organize their cognitive features. In this process, they researched and inquired, used problem solving procedures and designed experiments related to the status of the problem. Mohamed and Nai (2005) determined that in the process of problem solving students use many cognitive awareness behaviors such as visualizing the problem, deciding how to solve and evaluating the process and thus the process of problem solving provides an increase in being aware of cognitive features. Lucanceli et al. (1997) found out that cognitive awareness of students with low problem solving level is lower than those of with high problem solving level and determined that these students make mistakes in deciding how to use knowledge. In a research conducted

on the relationship between problem solving skills and metacognitive skills, students with high metacognitive skills also have high problem solving success (Boekaerts, 1997). Considering the results of the research, it can be said that it has resulted from this relationship between the development of cognitive awareness and problem solving. In different researches it was determined that people who are successful in problem solving exhibit more cognitive awareness behaviors than those with low level of success and cognitive awareness increases problem solving success. (Garduño, 1997; Howard et al., 2000).

Blakey and Spence (1990) determined metacognitive behavioral development strategies as defining what one knows and not knows, thinking by speaking, keeping a diary, planning, organizing and summarizing. Revising all the steps of this strategy it has shown that it is parallel in many ways to the problem-based experiment designing steps which is applied in biology lab course. When viewed from this point aspect, it can be said that problem-

based experiment designing processes will be employed in improving metacognitive skills.

2. Secondly, pre test-post test of metacognitive scores of prospective science teachers according to their gender were analyzed.

While pre test metacognitive skill score means of prospective teacher does not differ according to gender, in post tests it differs significantly in favor of females. Thus it can be said that designing problem-based experiments has more effect on improving metacognitive skills of females than males.

SUGGESTIONS

In the light of the results of this study, it has been suggested that it is more productive to create environments where prospective teachers can design open ended experiments using problem solving steps instead of conducting closed ended, prescription type experiments in lab courses (physics, chemistry, biology, science).

As the research was conducted on a formal education program there were certain limitations. In this study conducted with six classrooms, a control group couldn't be selected in order not to cause differences between the classes. The application can be repeated by experimental and control group in different studies.

This study is extremely important as it has been conducted on prospective science teachers who will conduct the experiments related to biology with different techniques in science classes in the future, who will use their metacognitive skills and who will have effect on their students improving these skills. In further researches related to this subject, it can be studied in detail (a) if conducting the laboratory classes with problem-based experiment designing for a long time has an effect on other skills such as cognitive skills(problem solving, creative thinking, inquiry-based learning etc.) (b) if metacognitive skills differ in different groups in which only designing experiments are used and problem-based experiment designing is applied, (c) the effect of design-ing experiments using different teaching approaches (project-based learning, argumentation-based learning, research-based learning etc.) on metacognitive skills (d) the effect of conducting the lessons of prospective teachers who have laboratory classes in different departments, with problem-based experiment designing and the reasons of differences in gender.

Conflict of Interests

The author has not declared any conflict of interests.

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Full Length Research Paper

The investigation of problem solving skill of the mountaineers in terms of demographic variables

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The aim of this research is to investigate problem solving skills of the individuals involved in mountaineering. 315 volunteers participated in the study. The research data were collected by problem solving scale developed by Heppner and Peterson and the Turkish version of which was conducted by Şahin et al. There are totally 35 items and only 3 items are not scored. The scale adapted to Turkey consists of six items. These are hasty approach, thinking approach, avoidant approach and evaluator approach, self-confident approach and planned approach. The data collected were analyzed through statistical package program (SPSS 16.0) and the results were interpreted. In our study, Cronbach's Alpha Value of the scale was calculated to be 0.61. In the evaluation of research data, One Way Anova and T-test were used. As a result, in planned approach sub-dimension due to gender variable, significant variables were found. As a result, significant relations in planned approach sub-dimension due to gender variable, in avoidant approach and hasty approach due to age variable. The most striking relationship was found in experience variable. A relationship was found between experience and avoidant, self-confident, planned and thinking approach sub-dimensions. No significant relationship was found in the variables of marital status and education status. Making the activities increasing the experience is thought to be effective on problem-solving skill.

Key words: Mountaineering, problem solving, nature sports, sportsmen.

INTRODUCTION

It is clear that nature and mountain sports that are presented to the tastes of large masses who are in search of alternative tourism do not comply with some rules and if it is done unconsciously they can threaten many lives (Ülker, 1992:5). There are many activities done in nature. Of these activities, some are very popular, have high risk or require advanced technics with adventure content (Kalkan, 2012:70). Nature sports include many sports and activities being performed in natural area such as rock climbing, mountaineering, speleology, etc. (Broadhurst, 2001). The most preferred ones among the nature sports are mountaineering and climbing sports (Attarian, 2002), because mountaineering is the one of the branches of nature sports that requires perhaps high struggle, risks and challenges. Graydon and Hanson (2010) emphasize that mountaineering is not suitable for everybody while describing this feature of mountaineering; they added that the ones hagridden by

mountains may find the mountains as impressive, attractive, sometimes disappointing and even deadly. Due to these risks and dangerous factors, problem-solving has an important role. According to Johson-Laird, problem solving is only being processed of only logic rules (quoted by Tougne et al., 2008:4). Some sportsmen have an interest in this sport for physical and mental struggle. This interest improves physical development as well as increases the qualifications mentally (Attarian, 2002). Many researchers mention the dangers of mountaineering. In this case, mountaineering is considered as a sport including immediate decisions and requiring problem solving skill.

Mountaineering and nature sports are among the sport branches having injury or death risk. Sports branches such as mountaineering, parachuting and rock climbing have an intensive enthusiasm factor. In this case, the skills and ability of the people dealing with this sport have become important. Mountaineering sport is an activity in which risk is extremely felt. In a research, Bisson (1999:208) emphasized the importance of problem solving in adventure experience and examined the effect of adventure experience on problem-solving skill. He mentions effective problem-solving. Outdoor activities are the activities in which the individuals or groups participate at their own request, leisure time or teaching skills, problem solving, providing group and individual security; making judgment and in which the participants facilitate philosophical, ethical and aesthetical growth (Hayashi and Ewert, 2006). Nature sports give motivation to the participants to join in the activities by offering necessary environments and activities in order to improve making judgment, team work, communication among the individuals and problem solving skills (Wagner and Campbell, 1994).

In nature sports and mountaineering, among the features correlated with effective leadership process, there are some attractive features such as self-confidence, problem-solving skills, competence, honesty, sincerity, self-highlighting, with high individual awareness, having dominant character, objective and providing emotional control (Dinç, 2006; Dubrin, 1995). Priest and Gass (1997) mentioned that nature leaders are competent in twelve fields. Effective leaders must have suitable know-how, security, environment, making organization, educative, facilitating, problem solving, decision making, judgment based on experience and communication skills (quoted by: Bymer, 2006).

Being educated and having problem solving skills are important in terms of developing mountaineering sports. This development will enlighten the development of mountaineering in the country. Considering that mountaineering is a risky and life threatening sport, knowing the individual limits and the importance of experience is necessary.

Since mountaineering includes a process performed under difficult conditions and a continuing stress process, it is important to know how to behave under difficult circumstances. The results of the study are expected to provide guidance to officers and directors. In the literature, it is seen that there is not a sufficient number of research about high-risk sports. In this context, it is important to analyze problem-solving behavior of those dealing with mountaineering and give information about the current situation in terms of the results to be revealed. This would be a source for important statements and future research.

METHOD

Considering the geographical location of Turkey, nature sport is emerging as an extremely popular sport. It is done in different regions of Turkey. Therefore, besides the surveys distributed by hand, online survey method was used. A total of 206 questionnaires were distributed on the camps and by hand; 188 questionnaires were returned. In order to expand the participation and to increase data collection easiness, online survey was conducted with those doing mountaineering regularly in the research; 127 participations were provided. A total of 315 sports from different region and clubs participated in the research. The study includes relational model of problem solving behaviors in terms of examining the relationship with some demographic variables.

Population and sample

The ones dealing with mountaineering in Turkey form the universe of the research. Considering the difficulty of reaching to those doing mountaineering, the research is limited to the sportsmen dealing with mountaineering regularly and actively. The scales obtained by hand were applied before climbing by the researchers going to camping and climbing. The sample of the study consisted of those dealing with mountaineering actively and regularly. 245 of the participants were males (77.8%), 70 of them (22.2%) were women. Research group consisted of 28 high schools (8.9%), 197 universities (62.5%), and 86 postgraduates (27.3%). The oldest age group in the study consisted of 33-40 age group (93 people / 29.5%), followed by 26-32 (21%) age group and 48 years and older (19%) age group. 52.1% of the sample consisted of singles.

Data collection tool

Problem Solving Inventory used in the research was developed by Heppner and Peterson (1982), and its adaptation to Turkish was conducted by Şahin et al. (1993). High scores taken from the scale was interpreted as being low of problem solving perception and the low score is interpreted as being high of the problem solving skill. There are totally 35 items in the scale and only 3 items cannot be scored. The scale adapted to Turkish consists of six factors. These are hasty approach, thinking approach, avoidant approach, evaluator approach, self-confident approach and planned approach (Akyüz, 2012).

Data collection

On the head of the questionnaires used in the research, there is

Table 1. Problem solving average of the sportsmen based on gender variable.

	Gender	N	Mean	Std. deviation	t	P
Avoidant Approach	Female	70	4.9173	.80378	1.307	.19
	Male	245	4.7643	.88043		
Evaluator Approach	Female	70	2.5211	.93121	1.917	.058
	Male	245	2.3000	.82659		
Self Confident	Female	70	2.5837	.51495	-1.366	.17
	Male	245	2.6881	.57730		
Planned Approach	Female	70	2.1153	.67274	-2.146	.03[*]
	Male	245	2.3143	.68721		
Thinking Approach	Female	70	2.0808	.69883	-1.724	.08
	Male	245	2.2343	.64424		
Hasty Approach	Female	70	3.8385	.52986	-.554	.58
	Male	245	3.8762	.49240		

$P < 0.05$[*]

some information such as for what purpose the research was conducted, how the questionnaire is marked and while marking, what are the points taken into account by the participant, the name and surname of the person conducting the study and the advisor, title, the institution they work. The data were collected between the dates of 20 November 2013 and 17 February 2014. The scale was conducted to the volunteers participated in the research during the research and in education camps. Besides, it was applied to the climbers as online survey via web from 20 January – 17 February 2014.

Reliability and validity analysis of data collection tool

For general security, Cronbach's Alpha coefficient was calculated. The methods developed for evaluating the reliability of the tests are called reliability analysis and the investigation of the questions in this test is called item analysis. The most method used to examine the reliability is Cronbach's Alpha Coefficient. In our study, Cronbach's Alpha value of the scale was calculated to be 0.61. The results were evaluated in the reliability range of 95%; the significance was evaluated as two way at the level of $p < 0.05$ and $p < 0.01$.

Data evaluation

The data collected by problem solving scale and demographic information survey were analyzed via statistical package program (SPSS 16.0) and the results were interpreted. First, in order to ensure demographic information and to acquire an idea about the questions, descriptive statistics including arithmetic average, standard deviation, frequency and percentage distributions were submitted. The data had a normal and homogenous distribution. The relationship between problem solving behavior of the sportsmen and demographic variables, independent samples (Independent samples) t test was used in intergroup comparison in the case of two groups in comparison of quantitative data (Independent Samples). In the case of more than two groups in comparison of the parameters among the groups, unidirectional (One way) Anova test was used and in the detection of the group causing differences, Tukey and LSD tests were used.

FINDINGS

In planned approach dimension, no significant relationship was found. Men show more planned approach compared to women (Table 1).

No significant relationship was found due to marital status (Table 2). In Tukey analysis conducted, in avoidant approach sub-dimension, a correlation was found between the mountaineers of 18 to 25 years old (X=4,67) and the mountaineers at the age of 48 and more (X=5,15). In hasty approach sub-dimension, a correlation was found between the mountaineers of 18 to 25 years old (X=3,67) and the mountaineers of 41 to years old (X=3,91) (Table 3).

In Tukey analyses conducted, a correlation was found between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in avoidant approach sub-dimension and between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in self-confident approach, between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in planned approach sub-dimension and between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in thinking approach (Table 4).

Table 2. Problem solving average of the sportsmen based on marital status variable.

	Marital status	N	Mean	Std. dev.	t	P
Avoidant Approach	Single	164	4.8659	.82261	-.393	.69
	Married	151	4.9023	.82461		
Evaluator Approach	Single	164	2.4228	.89465	-.996	.32
	Married	151	2.5254	.93130		
Self Confident	Single	164	2.5742	.54649	-1.144	.25
	Married	151	2.6424	.51150		
Planned Approach	Single	164	2.1463	.68334	-.358	.72
	Married	151	2.1738	.67823		
Thinking Approach	Single	164	2.0939	.66992	-.562	.57
	Married	151	2.1377	.71075		
Hasty Approach	Single	164	3.8476	.54268	.023	.98
	Married	151	3.8462	.49870		

Table 3. Problem solving average of the sportsmen based on age variable.

	Age	N	Mean	Std. deviation	f	P
Avoidant Approach	18-25	45	4.6722	.79205		
	26-32	66	4.8485	.69459		
	33-40	93	4.7903	.87794	2.928	.02[*]
	41-47	51	4.9608	.96225		
	48 and more	60	5.1583	.69497		
Evaluator Approach	18-25	45	2.5481	.98769		
	26-32	66	2.5859	.79970		
	33-40	93	2.4624	.96062	.699	.59
	41-47	51	2.4379	.99441		
	48 and more	60	2.3333	.82567		
Self Confident	18-25	45	2.5296	.63989		
	26-32	66	2.6515	.45548		
	33-40	93	2.5878	.55690	.497	.73
	41-47	51	2.6569	.53168		
	48 and more	60	2.6028	.47942		
Planned Approach	18-25	45	2.0944	.65991		
	26-32	66	2.3409	.63796		
	33-40	93	2.1828	.75644	1.960	.10
	41-47	51	2.0784	.72541		
	48 and more	60	2.0417	.53711		

Table 3. Contd.

					f	P
	18-25	45	2.1200	.74639		
	26-32	66	2.2545	.60209		
Thinking Approach	33-40	93	2.0667	.66681	.909	.45
	41-47	51	2.0745	.75042		
	48 and more	60	2.0667	.71560		
	18-25	45	3.6790	.53193		
	26-32	66	3.7811	.51381		
Hasty Approach	33-40	93	3.8626	.52434	2.459	.04[*]
	41-47	51	3.9673	.45774		
	48 and more	60	3.9185	.54158		

$p < 0.05$[*]

Table 4. Problem solving average of the sportsmen due to experience variable.

	Experience	N	Mean	Std. deviation	f	P
Avoidant Approach	1-3 years	86	4.7006	.90815		
	4-7 years	83	4.9458	.73465		
	8-11 years	48	4.7865	.84895	3.013	.03[*]
	11 years and more	98	5.0383	.77439		
Evaluator Approach	1-3 years	86	2.4845	1.06600		
	4-7 years	83	2.6145	.84341		
	8-11 years	48	2.3958	.98369	1.143	.33
	11 years and more	98	2.3776	.77421		
Self Confident	1-3 years	86	2.7422	.67913		
	4-7 years	83	2.6084	.47884		
	8-11 years	48	2.5000	.36709	3.114	.02[*]
	11 years and more	98	2.5391	.46946		
Planned Approach	1-3 years	86	2.3517	.80108		
	4-7 years	83	2.1175	.63479		
	8-11 years	48	2.0573	.57943	3.317	.02[*]
	11 years and more	98	2.0765	.62012		
Thinking Approach	1-3 years	86	2.2419	.76273		
	4-7 years	83	2.1470	.66486		
	8-11 years	48	2.1917	.58340	3.445	.01[*]
	11 years and more	98	1.9388	.66265		
Hasty Approach	1-3 years	86	3.7726	.55120		
	4-7 years	83	3.8086	.58905		
	8-11 years	48	3.8310	.42325	2.107	.09
	11 years and more	98	3.9524	.46433		

$p < 0.05$*.

Table 5. Problem solving average of the sportsmen due to educational status variable.

	Age	N	Mean	Std. dev.	f	P
Avoidant Approach	Primary school	3	5.0833	.80364	.110	.97
	High School	28	4.8661	.92417		
	License	197	4.8782	.85960		
	Postgraduate	87	4.8937	.70776		
Evaluator Approach	Primary school	3	2.7778	2.50185	.168	.95
	High School	28	2.4881	1.07528		
	License	197	2.4873	.89499		
	Postgraduate	87	2.4215	.83598		
Self Confident	Primary school	3	2.8889	1.26198	1.178	.32
	High School	28	2.7321	.57438		
	License	197	2.6210	.54596		
	Postgraduate	87	2.5249	.43767		
Planned Approach	Primary school	3	1.9167	1.01036	.284	.88
	High School	28	2.1607	.66393		
	License	197	2.1624	.69226		
	Postgraduate	87	2.1609	.65700		
Thinking Approach	Primary school	3	1.9333	1.13725	.195	.94
	High School	28	2.1786	.72692		
	License	197	2.1259	.72562		
	Postgraduate	87	2.0759	.57728		
Hasty Approach	Primary school	3	4.2593	.70565	1.445	.21
	High School	28	3.6905	.56280		
	License	197	3.8359	.50714		
	Postgraduate	87	3.9080	.52615		

No significant relationship was found based on educational status (Table 5).

DISCUSSION

Considering that mountaineering is a sport having risk, danger and excitement, how the individuals behave against the problems in climbing has gained an important dimension. In risky sports like mountaineering, the research is important in terms of overcoming the problems and revealing how to behave in these situations. Problem status created by immediate environmental changes in nature sports activities often emerge (Hanson, 2010:342). In our research, how the mountaineers behave against problems is investigated.

When the risks of mountaineering are taken over, it is thought that problem solving skill comes to the fore. When Table 1 is examined, different results have come out due to the variable of gender. In terms of point averages obtained from problem solving inventory, no correlation was found in the sub-dimensions of avoidant approach, evaluator approach, self-confident approach, planned approach, thinking approach and hasty approach. A correlation was found between gender variable and the planned approach from the sub-dimensions of problem solving behaviors. It was conducted that men displayed more planned behavior than women (p<0,05). This situation can be correlated with that the number of men dealing with mountaineering is more (77.8%). According to their study, Jack and Ronan (1998) state that the people participating in

various high-risky sportive activities especially the mountaineers and parachutists have higher tendency of looking for general and various excitement than the ones participating in certain lower risky sports. It can be thought that men having more experience lie behind planned approach of men to problem solving. By virtue of social roles, it is known that men deal with nature more. For this reason, men have more experience in mountaineering activities. Due to gender, the investigation of the risks in mountaineering sport will contribute to the findings of the research. Tougne et al. (2008) concluded in a study in which they simulated high altitude climbing and examined anxiety and problem solving that as the altitude increases, situational anxiety increases simultaneously, individual problem solving skill decreases and problem solving skill has little effect on collective study. Based on this, it can be concluded that especially high altitude has an effect on problem solving. Huey et al. (2007) investigated age and gender factors in the research on mountaineering. They say that the death rates of men and women are close to each other in high mountains. That is to say on high mountains, gender does not emerge as an effective variable. This situation can be correlated with the approach of men and women mountaineers to the situations causing problem or risk perception. Since problem solving has a crucial importance in mountaineering, the importance of our research emerges. In mountaineering, men display more planned approach against problems than women.

Another finding in our study is that marital status has no effect on problem solving skill. Looking at problem solving point means that there are no big differences among means. Some researchers have shown how problem is solved within a group. Some research has been conducted on how to solve problem as individual or group. In a simulated mountaineering research, Tougne et al. (2008) stated that altitude had an effect on problem solving skill. As altitude increases, problem solving skill reduces. Our research has revealed that whether the mountaineers are married or single does not display any attitude in problem solving. The factors such as how the mountaineers pass their daily life, their group of friends, climbing partners and their business life are thought to be effective on this variable.

The problems experienced in social life, at home or business life are known to affect stress. From this perspective, we can say that married or single mountaineers are happy in their daily life. The people turning to different sports choose the sports branches that give them pleasure, enjoy them and force their limits. The situations such as wild nature, adventure, being close to nature, physical exercises, natural view, the desire of being alone, socialization, taking risks, challenging, looking for enjoyment and indefinites attract the mountaineers (Gürer et al., 2007:164). Home environment of the people

or their circle of friends may trigger the desire of going to nature. That a married mountaineer and a single mountaineer remote from the stress while in nature does not affect their approach to problem solving. The silence of nature or struggling with nature may provide this balance. According to Anzieu and Martin (2003), it is very important to reach the target with small climbing team, their dynamics, group formations and problem solving process (Quoted by Tougne et al., 2008). That is to say, if reaching to the summit wanted to be climbed is an aim, intergroup dynamics and problem solving skills are very important. According to our research, marital status does not affect these dynamics. In our research, no significant correlation was found between marital status and problem solving skill.

One of the variables that a significant correlation was found in our research is age (Table 3). In nature sports, there are known studies about age. It is know that mountaineering is a risky sport. Problem solving includes many transition processes. Problem solving comes to the fore as an important skill in many areas. It is mentioned in the researches that the ones dealing with risky sports have strong personalities. These personalities are thought to be correlated with age. Considering age related mean scores, a significant association was found between avoidant approach and hasty approach sub-dimensions. In Tukey analysis conducted, a correlation was found between the mountaineers of 18 to 25 years old and those 48 years old and older in avoidant approach sub-dimension (p<0.05). Accordingly, the older mountaineers display more avoidant approach compared to the younger mountaineers. The reason of the fact that older mountaineers display more avoidant approach may be the reduction of their physical properties. In their research, Huey et al. (2007) revealed the result that the chance of being reached to the summit by the mountaineers older than 40 years old is less. They stressed that younger mountaineers make the summit more. This is a result revealing the importance of age in mountaineering. In the sub-dimension of hasty approach, a correlation was found between the mountaineers of 18 to 25 years old and those of 41 to 47 years old. Looking at the results, the older mountaineers display hastier attitude than the younger ones. This situation may be correlated with the reduction of self-confidence with increasing age. Considering that mountaineering is a difficult and risky sport, age offers disadvantage in many situations. Age factor is known to be important in many nature sports. In his study performed on nature, Tanesen (2008) said that education, communication, motivation, problem-solving, duty and responsibility, team work, reliability, decision-making and evaluation are important. According to our results, the older mountaineers avoid the problematic situations, as well as they display a hasty attitude in a problematic situation.

The most obvious and outstanding result in our study is that experience has an impact on problem-solving skills. It is known that nature sports people are strong and tough e with personal discipline (Kuru, 2000). In the researches performed on nature sports the risk factors and experience were investigated. The importance of experience in many nature sports has been stressed. Experience in mountaineering has a crucial importance. In his study, Çelebi (2002) observed reliability, risk-taking, team work and problem-solving skills of leadership skills and being in nature plays an effective role in the development of these skills. Rosnet and Heuze (2003) emphasized that important decisions in high altitudes must be taken alone in the acceptance of a situation in which the group plays a role in decision making. Likewise, he mentions experience in problem solving. In our study, looking at the point averages of experience variables (Table 4), significant variables were found between the sub-dimensions of avoidant approach, self-confident approach, planned approach and thinking approach and mountaineering experience ($p < 0.05$). In Tukey analyses conducted, a correlation was found between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in avoidant approach sub-dimension and between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in self-confident approach, between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in planned approach sub-dimension and between the mountaineers having experience from 1 to 3 years and those having 11 years and more experience in thinking approach. As it is understood from the results, the mountaineers having high experience in problem solving avoid problematic situations more than the mountaineers with less experience. This situation may be correlated with the development of experienced based foresight skill of the mountaineers. An important result that will create difference in our study is that the mountaineers with less experience display self-confident, planned and thinking approach on the contrary to the expected. This situation may result from the fact that the time passed on the mountains and climbing and it is not encountered with many problems. Experience may be due to several factors. Risk in mountaineering may be associated with an environmental, individual and group-based activity. Mountaineers may be affected in a positive and negative way due to the altitude, climate, the exposure rate of altitude and the illness status of teammates and this probably increases the risk level (Gürer et al., 2007). Not being experienced of such kind of situations by the mountaineers affects their problem solving skills depending on the lack of experience. Anxiety situations resulted from the environment may be effective on the fact that the mountaineers having less

experience display more self-confident, planning and thinking approach. Some researchers (Kocowski, 1964; Thurner and Wennehorst, 1972) stress that the high state anxiety increases the awareness of the participants in limited times and it has a positive effect on problem solving performance (Quoted by: Tougne et al., 2008:6). Besides, in his research, Goldenberg (2001) included the problem solving in comprehension skill of the sportsmen. This situation reveals the importance of problem-solving. Nevertheless, experience is a knowledge that increases with time and it affects problem-solving.

In our research, problem solving skill and education status variable were also examined. In the analysis conducted, no significant correlation was found (Table 5). Looking at the education status, it is seen that most of the mountaineers (N=197) have graduated from university or studying in university (62.5%). It is seen that education graduates are more than university graduates (N=87;27.3%). As it is understood from the data, most of the mountaineers who participated in the research are people with high education status. In other researches, various results about education status variable are seen. Lack of correlation in education status variable may result from the fact that most of the participants take higher education. Priest and Dixon (1991) mention the importance of the individual competence in their research on nature leaders. Individual competence may be associated with high education level. Looking at the averages, it is seen that the values are close to each other. Mountaineers display similar approaches against the problems. Although there is no significant correlation, it is possible to say that high education level makes positive contribution to problem solving degree.

As a result, the sports branches performed within mountaineering activities require problem solving skill both by the participant and the specialist, because mountaineering sport includes risk and danger. Besides, the responsibility of individual and group increase these risks. The reason of this is the presence of the dangers encountered very often in the activities. In mountaineering, the striking approaches in problem solving were concluded to be planned approach and avoidant approach. Besides, it can be said that self-confident approach and thing approach are also striking in experience variable. Increasing the experience and depending on this keeping away from the dangers can only be developed by going to the mountains and integrating with nature. Canan and Ataoğlu (2010) have found in their research that as time passes with the sport getting increased, depression and anxiety findings are decreased, and there is a linear relationship between time and problem solving skill perception. Therefore, it is possible to say that dealing with mountaineering regularly contributes to problem solving skill. Depending on the experience, it is thought to develop some skills such as

taking risk, decision making, evaluating and making judgment. The mountaineers with high experience are recommended to take more risks in a group. So, the rate to exposure risks and dangers will reduce. Our research is important in terms of throwing more light on the new studies to be conducted. The investigation of problem solving skill will enrich the literature for different nature sports.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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Full Length Research Paper

DIF analysis across genders for reading comprehension part of English language achievement exam as a foreign language

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The purpose of this study is to carry out differential item functioning (DIF) analysis for content areas of a reading comprehension subtest using four area indices within Item Response Theory (IRT) framework. The differences in the magnitudes of the area indices were compared based on the subject areas. The DIF analysis was carried out across gender groups only. The item level data of the English reading comprehension subtest were gathered from English Language Achievement exam done in School of Foreign Languages, Ege University, Turkey, in 2013. A sample of 2,117 examinees (1,011 males and 1,116 females) was randomly selected. For the DIF analysis, (a) an IRT model for the item characteristic curves was specified; (b) model-data-fit was investigated for the selected IRT model;(c) Item characteristic curves were separately computed for each group on a common scale; finally, (d) indices indicating the degree of DIF on each item were computed. The results of the study indicated that both un-weighted and weighted area indices showed non-uniformity in DIF in the item characteristic curves in reading comprehension subtest in most cases. A significant correlation was observed between un-weighted and weighted area indices.

Key words: Item characteristic curve, item bias, differential item functioning (DIF).

INTRODUCTION

A number of researchers have indicated that there are gender differences in achievement of verbal ability on items requiring inference or application, particularly for science-related content (Lawrence and Curley, 1989; Lawrence et al., 1988). For instance, males are likely to perform better than their female counterparts on verbal items related to natural sciences or technical content, whereas females are more successful than males on items in the social sciences, arts, or humanities. In addition, based on the results of the several studies, it can be concluded that reading comprehension items related to technical aspects of science is gender based (Lawrence and Curley, 1989; Carlton and Harris, 1992; Curley and Schmitt, 1993). In addition, some studies reported gender differences in content categories of structure, vocabulary, and reading in second or foreign language testing (Bügel and Buunk, 1996; Chavez, 2001; Ryan and Bachman,1992; Gafni,1991; Brantmeier, 2001,

2003; Payne and Lynn 2011). Payne and Lynn (2011) showed that females performed significantly better than males in second language reading comprehension when they were matched in all these variables. This suggests that females have a stronger module for second language processing than males do. Moreover, Pae (2004b) analyzed and showed that gender differences in reading comprehension items classified as logical inference were highly likely to favor males. As stated by Pae (2004a, 2012), conducting gender DIF studies of language tests will encourage language researchers to analyze various components that seem to contribute to the apparent gender difference in language tests. This will thereby provide valuable information for classroom teachers and their students, curriculum design of the educators, students' assessment of foreign language instructors, and ultimately administrators' decisions on language policy.

For reasons explained above, identifying test items-which show differential item functioning in favor of any gender group- is an important issue. This is more so especially in the selection and placement of decisions for the purpose of allowing equal opportunity for persons who have equal ability. These persons may belong to a disadvantaged group, which is not taken into consideration in most cases. Since tests are increasingly used as devices for evaluation and placement, the test constructors must make every effort to remove any possible bias from the items. Statistical differential item functioning analysis techniques are frequently used to detect items that include DIF in a test or in a pool of questions in order to increase the test validity. Traditionally, item analysis procedures have been used to determine empirically whether items function as intended or not. Differential item functioning analysis detection techniques serve the same purpose but specifically focus on the validity of items for different subgroups that take the test (Ironson and Craig, 1982; Shepard, Camilli and Williams, 1985: Maller, 2001). On the other hand, detection of DIF is one of the most important issues in test development and evaluation efforts. There have been many attempts made to minimize the DIF in test by the use of several statistical techniques. If the test is used for heterogeneous groups, studying item bias or DIF becomes more important and questions arise as follows:

1. Is the test free of DIF across different gender groups?
2. Is the test free of DIF across different SES groups?
3. Is the test free of DIF across different regions of the country?
4. Is the test free of DIF across different school types?
5. It is obvious that test items should not favor one of the groups in the population tested.

Various methods that have been proposed for detecting DIF in tests include the Classical Test Theory (CTT) techniques and Item Response Theory (IRT) techniques, generally (Ironson and Craig, 1982; Hambleton and Rogers, 1988; Seong and Subkoviak, 1987; Lim and Drasgow, 1990). Comparison of (p) values (the mean item difficulty level) and item discrimination parameters (r) (that is, the extent at which an item is able to differentiate among individuals possessing different levels of the ability or trait underlying the test or scale), which are based on CTT, confounds DIF and true sub-population differences in the trait. This is because this may lead to a high rate of incorrect conclusion that items exhibit DIF when they truly do not (Shepard et al., 1985; Lim and Drasgow, 1990). Furthermore, significant differences in p values may be a result of psychometrically desirable item discrimination power rather than real DIF. Finally, the use of p values may lead to a large number of type II errors by failing to detect items that truly function differently across groups (Lim and Drasgow, 1990). The other method that falls in the CTT techniques is chi-square approach (Scheuneman, 1987). This method assumes that examinees from different groups but with roughly equivalent total test scores are expected to have equal probabilities of success on the item.

A theoretically more appropriate framework for the study of DIF, which avoids the serious deficiencies inherent in CTT approaches, could be found in item response theory (IRT) (Hambleton and Rogers, 1988; Hambleton et al., 1991; Shepard et al., 1984; Devine and Raju, 1982). Their close connection to the most widely accepted definition of item bias has caused IRT-based methods to become popular and some researchers consider these methods "theoretically preferred" (Shepard et al., 1985; Lim and Drasgow, 1990). This definition states that an item is biased or shows DIF if examinees of the same ability but different sub-groups do not have the same probability of correct response to the item (Adams and Rowe, 1988; Lim and Drasgow, 1990; Mellenbergh, 1989; Hambleton et al., 1991; Raju et al., 1993). Central to IRT is a functional relationship between the probability $Pi(\theta)$, that individuals with specific ability θ will respond correctly to an item, and certain item characteristics, or item parameters (Lim and Drasgow, 1990). IRT models often use an item discrimination parameter (a), an item difficulty parameter (b), and a pseudo chance level (c). The graph of $Pi(\theta)$ as a function of θ is known as an item characteristic curve (ICC). Related to the DIF research, the most important advantage of IRT over CTT is the sub-population-invariant property of the ICC and item parameters. Analogous to the coefficients of a simple linear regression equation, these

parameters are invariant when sub-population with different θ distributions is formed. Consequently, IRT-based item parameters do not confound DIF with sub-population differences in ability (Lim and Drasgow, 1990). On the other hand, from an IRT perspective, DIF exists when individuals from different subgroups, but possessing identical levels of the latent trait (θ), have unequal probabilities of correctly answering an item. For an item to be labelled as measuring identically across groups, ICCs, item parameters must be identical (within sampling error) across different sub-populations (Lim and Drasgow, 1990). Thus, the study of DIF within an IRT framework is a matter of comparing the item characteristic curves (ICCs) for the two sub-groups (that is male vs. female) (Hambleton and Swaminathan, 1985; Mellenbergh, 1989).

In this study, ICCs were compared across gender groups to provide evidence on whether one of the groups had an advantage in syntax, connecting and synthesizing, vocabulary, extracting explicit information questions in the content areas of reading comprehension subtest of the English Language Achievement exam of School of Foreign Languages at Ege University, Turkey. More specifically, the present study was designed to accomplish the following purposes: (i.) to examine the direction of DIF for each test item in the reading comprehension subtest across males versus females, (ii.) to compare the magnitudes of the DIF indices between syntax, connecting and synthesizing, vocabulary, extracting explicit information items in the reading comprehension subtest and (iii.) to compare the different area indices used in the DIF analysis.

METHODOLOGY

Subjects

The item level data of the English Reading Comprehension subtest were gathered from English Language Achievement Exam of School of Foreign Languages at Ege University, Turkey, in 2013. A sample of 2,117 examinees (1,011 males and 1,116 females) was randomly selected from all examinee population. About 52.7% were females, and their ages ranged from 17 to 19.

Instrument

The English Reading Comprehension Achievement subtest consists of a total of 40 items. It focuses on the measurement of the students' achievements for understanding and evaluating what is read in English. The items subtest can be classified into four types: (a) syntax, (b) connecting and synthesizing, (c) vocabulary, (d) extracting explicit information. All of the 40 English Reading Comprehension items are based on a multiple choice format with four item options. Reliability estimation for the sample was

assessed using the KR-20 Coefficient. KR-20 Coefficient for the 40 English Reading Comprehension items was 0.82. Morover, the factor structure of the English Reading Comprehension subtest was examined in order to know if the data met the unidimensionality assumption of the IRT models. A scree test indicated that there was a sharp decrease from the first eigenvalue to the second in the total sample (5.93; 1.32; 1.11; 1.03, respectively). The structure observed in the factor analyses indicates that the English Reading Comprehension subtest includes a strong primary factor in general. This finding constitutes evidence for the claim that the data on the English Reading Comprehension subtest met the unidimensionality assumption of the IRT scaling.

DIF analysis procedure

The following steps were followed in DIF analysis:

1. A model was specified for the item characteristic curve,
2. Model-data-fit was investigated for the selected IRT model,
3. ICCs were separately computed on a common scale for each group,
4. Indices were computed indicating the degree of DIF on each item (Mellenbergh, 1989).

In the present study, IRT DIF area indices were used. A major advantage of this method is that the various ICC theory models describe the item parameters independently of the samples used for estimation (Devine and Raju, 1982). This means that the item parameters are independent of the distributional characteristics of the sample. Therefore, under any IRT model, parameters from different samples should be equal. Items whose parameters are notably unequal violate the assumptions of the model, and consequently are said to be biased because they may be measuring something different for a particular group (Adams and Rowe, 1988).

DIF indices can be classified as weighted and un-weighted. If the number of examinees in two groups is not considered, then it is un-weighted. In order to see the direction of the DIF, the signed area index is used. If un-weighted area index is used, then it could be signed or unsigned. In the unsigned area index the DIF appears, but the direction cannot be seen.

The un-weighted unsigned area index is:

$$B_{unsigned} = \int_{p}^{q} \left| P_{1i}(\theta) - P_{2i}(\theta) \right| d\theta$$

where $P_{1i}(\theta)$ and $P_{2i}(\theta)$ are the item characteristic curves in the first and second groups and p and q are the range of abilities of interest.

The un-weighted signed area index is:

$$B_{signed} = \int_{p}^{q} \left\{ P_{1i}(\theta) - P_{2i}(\theta) \right\} d\theta$$

The signed index shows the direction of DIF. If $P_{1i}(\theta)$ is usually larger than $P_{2i}(\theta)$, the measure is positive, indicating that the item shows DIF in favor of the first group. A negative index implies the DIF is in favor of the second group (Mellenberg, 1989).

If the two groups are compared with different numbers of examinees, then the area between the two ICCs is weighted as Linn et al. proposed (Cited in Shepard et al., 1985). When the index is weighted, it gives more weight to parts of the ability scale where

most data are concentrated and where the difference in two probabilities at θ_j has a small variance. So, if weighted area index is used, then it could be signed or unsigned.

The weighted unsigned index used in the present study is:

$$B_{unsigned} = \sum_{j=1}^{N}\left\{P_{1i}\left(\theta_j\right) - P_{2i}\left(\theta_j\right)\right\}^2 / Ns_i^2\left(\theta_j\right)$$

where; N is the total number of examinees in the two groups and $s_i(\theta_j)$ is the variance error of the difference in the two probabilities at θ_j.

The corresponding signed index is:

$$B_{signed} = \sum_{j=1}^{N}\left\{P_{1i}\left(\theta_j\right) - P_{2i}\left(\theta_j\right)\right\}\left|P_{1i}\left(\theta_j\right) - P_{2i}\left(\theta_j\right)\right| / Ns_i^2\left(\theta_j\right)$$

The interpretation of area indices should be based on non-uniformed and uniformed DIF. The shape of the item characteristics curves can be the same in two groups when the curves do not coincide, as in the cases when the item is more difficult in male group than in the female group. This is called uniform DIF. It is also possible to have ICCs crossing each other on the ability continuum, which may indicate the non-uniformed DIF on the item. In this case ICCs cross ability point $\theta = 0$. For abilities below 0, the item is more difficult in female group and for abilities above 0 the item is more difficult in male group. In the signed area indices, if there is non-uniformed DIF on the item, the areas below and above the crossed points can cancel each other and DIF may not be identified even though the ICCs do not coincide. Therefore, un-weighted (signed and unsigned) area indices were considered in order to obtain evidence about the uniformity and non-uniformity of the DIF in the comparisons.

Kruskal-Wallis test was used to evaluate the magnitudes of the area indices in the reading comprehension subject areas of syntax, connecting and synthesizing, vocabulary, extracting explicit information items. To compare the area indices among the subject areas, correlation coefficients were used.

In the first step of the analysis, the fit of one, two and three parameter IRT models was calibrated in each of the gender groups. As a result of these analyses, it was decided to use the two-parameter Birnbaum model (1968) in the ICC comparisons since it served better overall fit statistics compared to the other models.

For the DIF analysis, two package programs were used. The BILOG computer program (Mislevy and Bock, 1986) with Bayesian modal estimation was used for test calibration. For the DIF analysis, a package program Calcbias developed by Oort (1992) was used.

RESULTS

Before the DIF analysis, the reading comprehension subtest was rescaled in order to equate the mean θ to 0 and the standard deviation to 1 across the gender groups for the purpose of establishing a comparable unit for the DIF analysis. Therefore, the comparisons of ICCs were made in the form of female versus male. Four area indices were calculated for each subject area of reading

comprehension subtest as unweighted signed area "SA", unweighted unsigned area "USA", weighted signed area "WSA" and weighted unsigned area "WUSA" indices. The signed area indices indicated the direction of DIF. If the area index was positive in value, it was interpreted as DIF against the female group. A negative index implies the DIF is against the male group. In order to determine whether there are significant mean rank differences among the magnitudes of the area indices across different subject areas of the items with respect to gender groups, the Kruskal-Wallis non-parametric test was carried out. The significance levels of the tests are all evaluated as p=0.05. The results of the analyses were presented separately for each subtest.

After the first scaling, 40 reading comprehension items were rescaled for each sex, in order to compute the ICCs separately for each group on a common scale. Finally, indices were calculated indicating the degree of DIF on the items.

In the reading comprehension subtest, 4 items are in the syntax, 17 items are in the connecting and synthesizing, 13 items are in the vocabulary and 6 items are in the extracting explicit information sections with respect to subject areas. The area indices with respect to the gender groups are given in Table 1.

When the values of the un-weighted indices are evaluated there are 4 indices (10.0%) identified as jump outs in the un-weighted signed area (SA), but there are 12 indices (30.0%) identified as jump outs in un-weighted unsigned area (USA). However, when weighted indices are considered, there are no jump out indices observed in either WSA or WUSA.

On the other hand, when both un-weighted and weighted area indices (SA and USA) were compared, it was seen that the values of the unsigned area indices are larger than the signed area indices. This is the evidence of the existence of non-uniformity in the ICCs across the gender groups.

As it is shown in Table 1, DIF has been observed with respect to both weighted and un-weighted area indices. There are 21 items (52.5%) which showed DIF against males according to un-weighted signed area (SA) indices. On the other hand, 13 of 40 items (32.5%) indicate that DIF is against males according to weighted signed area indices (WSA).

As indicated in Table 1, 19 of 40 items (47.5%) showed DIF is against females with respect to the un-weighted signed area indices (SA). However, 27 items (67.5%) indicated DIF is against females with respect to the weighted signed area indices (WSA). On the other hand, according to the weighted area indices there are more items, which showed DIF in favor of males.

Table 2 points out the DIF comparisons among the

Table 1. Area indices in female versus male comparisons of reading comprehension subtest items.

Item no.	Content areas	Un-weighted		Weighted		
		SA	USA	WSA	WUSA	DIF in favor of Gender
1	connecting and synthesizing	0,4240	0,4540	0,0515	0,0515	Male
2	connecting and synthesizing	0,2960	0,4147	0,0532	0,0535	Male
3	connecting and synthesizing	-0,8980	1,7602	-0,0087	0,0087	Female
4	connecting and synthesizing	0,0940	1,4422	0,0162	0,0313	Male
5	connecting and synthesizing	0,0760	0,0898	0,0191	0,0191	Male
6	vocabulary	-0,7500	1,4595	0,0255	0,0390	Female
7	vocabulary	0,3160	0,4266	0,0748	0,0748	Male
8	vocabulary	-0,0370	0,6618	0,0104	0,0347	Female
9	vocabulary	0,0790	0,0790	0,0171	0,0171	Male
10	connecting and synthesizing	-0,0280	0,4798	0,0509	0,0576	Female
11	extracting explicit information	-0,0730	0,1919	-0,0037	0,0205	Female
12	connecting and synthesizing	-0,4180	0,4750	-0,0221	0,0345	Female
13	connecting and synthesizing	-0,0170	0,1512	-0,0083	0,0136	Female
14	extracting explicit information	-0,1630	0,2715	0,0069	0,0152	Female
15	vocabulary	-0,1450	0,2547	-0,0304	0,0304	Female
16	vocabulary	0,0170	0,1736	0,0051	0,0117	Male
17	vocabulary	0,1330	0,1904	0,0373	0,0379	Male
18	vocabulary	0,0630	0,1698	0,0130	0,0191	Male
19	syntax	0,1390	0,1391	0,0346	0,0346	Male
20	syntax	-1,2210	1,8292	-0,0056	0,0089	Female
21	syntax	-0,0460	0,1414	0,0009	0,0044	Female
22	syntax	1,3580	1,6190	0,0087	0,0172	Male
23	vocabulary	-0,0190	0,1020	0,0057	0,0121	Female
24	vocabulary	0,3300	1,5862	0,0295	0,0371	Male
25	vocabulary	-0,0940	0,9995	0,0140	0,0141	Female
26	connecting and synthesizing	0,2390	0,8067	0,0163	0,0297	Male
27	extracting explicit information	-0,0030	0,2643	-0,0095	0,0223	Female
28	connecting and synthesizing	0,1370	0,2562	0,0145	0,0181	Male
29	connecting and synthesizing	0,3020	0,6061	0,0318	0,0364	Male
30	connecting and synthesizing	-0,0730	0,2007	-0,0069	0,0219	Female
31	extracting explicit information	0,1050	0,1891	0,0033	0,0048	Male
32	extracting explicit information	-0,2240	0,2663	-0,0202	0,0202	Female
33	vocabulary	-0,0380	0,2095	0,0008	0,0009	Female
34	vocabulary	0,3000	0,5012	0,0359	0,0374	Male
35	connecting and synthesizing	-0,1490	0,6107	-0,0009	0,0156	Female
36	connecting and synthesizing	-0,0600	0,0659	-0,0229	0,0229	Female
37	extracting explicit information	-0,1640	0,2424	-0,0173	0,0227	Female
38	connecting and synthesizing	-0,0600	0,0710	-0,0132	0,0134	Female
39	connecting and synthesizing	0,0670	0,0670	0,0216	0,0216	Male
40	connecting and synthesizing	0,2130	0,4864	0,0114	0,0115	Male

Table 2. Percentages of items indicated DIF in favor of gender groups with respect to subject areas of reading comprehension subtest.

Sex		Syntax		Connecting and synthesizing		Vocabulary		Extracting explicit information	
		SA	WSA	SA	WSA	SA	WSA	SA	WSA
Female	# of Item	2	1	8	7	6	1	3	3
	% of Item	50.00	25.00	47.06	41.18	46.15	7.70	50.00	50.00
Male	# of Item	2	3	9	10	7	12	3	3
	% of Item	50.00	75.00	52.94	58.82	53.85	92.30	50.00	50.00

subject areas with respect to the un-weighted signed area indices and weighted signed area indices across gender groups. 2 of 4 items (50.0%) showed DIF in favor of the male group in the syntax section with respect to un-weighted SA indices, whereas 3 items (75.0%) showed DIF in favor of the male group in WSA indices. 9 of 17 items (52.94%) showed DIF in favor of the male group, whereas 10 items (58.82%) showed DIF in favor of the same group in the connecting and synthesizing section with respect to WSA indices. On the other hand, when the female group is considered for this section with respect to the SA there are 8 items (47.06%) showing DIF in favor of this group, whereas 7 items (41.18%) showed DIF in favor of the same group. As for the vocabulary section, 6 items (46.15%) showed DIF in favor of females with respect to the un-weighted signed area (SA) indices; in the weighted signed area (WSA) indices only 1 item (7.69%) indicated DIF in favor of the same group (Table 1).

On the other hand, 5 items (83.33%) showed DIF in favor of females according to the un-weighted signed area (SA) indices with respect to extracting explicit information section. For the weighted signed area (WSA) indices, 13 items (50.0%) showed DIF in favor of the female group with respect to vocabulary section (Table 2).

In order to compare the magnitudes of the area indices with respect to subject areas of the reading comprehension subtest items, the non-parametric Kruskal-Wallis test was used.

According to the results, no significant mean rank differences have been observed among the area indices across the items in the subject areas of syntax, connecting and synthesizing, vocabulary and extracting explicit information.

The correlations among the four area indices in the Reading Comprehension subtest comparisons indicated that there were two significant correlations (Table 3).

The first one is observed between the un-weighted signed area (SA) indices and the weighted signed area

Table 3. Correlation among the area indices in gender comparison.

	SA	USA	WSA
USA	-.191		
WSA	.407*	.085	
WUSA	.251	.065	.710*

*Significant at p< 0.01.

(WSA) indices since the correlation coefficient, r=.407 is significant at p=.000. The second correlation was observed between the weighted signed (WSA) indices and the weighted unsigned (WUSA) area indices which produced r=.71 that is significant at p=.000.

DISCUSSION AND CONCLUSION

When the DIF analysis of the reading comprehension subtest is considered, the items do not function as intended since they are not free from DIF. In the subtest, most of the items (21 items) favored the female group with respect to the un-weighted signed area indices. In contrast, with respect to the weighted signed (WSA) area indices, 27 of the 40 cases indicated DIF in favor of the male group.

When the mean theta levels obtained for each group are compared, a difference is observed across the gender groups that accounts for the weighting of the ICCs in the DIF analysis. For this reason, considering the weighted area indices might be more reasonable for the Turkish subtest. Therefore, if the weighted indices are considered, males have a greater advantage in responding to the reading comprehension items. The result of the study also indicated that the differences between the magnitudes of the un-weighted SA and the un-weighted USA indices showed non-uniformed DIF in almost all of the cases when ICCs were compared. This finding implies that the students from different sub-groups

with identical levels of ability have unequal probability of answering the items correctly. In this subtest, jump outs were observed only in the un-weighted indices.

Analysis also revealed that there is a significant correlation observed between the un-weighted SA indices and the weighted signed area WSA indices in the data set of the reading comprehension subtest. However, it is not a high relationship. The correlation coefficient of r=.407 is significant at p=.000. But it is not surprising to obtain low correlation among the different area indices because there are some differences in the calculations of the four area indices. Furthermore, the weighted area indices (WSA and WUSA) have a significant and high relationship among themselves. When the different DIF indices were considered, the opposite results were obtained. For this reason, there was a problem in deciding which area indices were more meaningful in the DIF analysis. If the mean theta level was equal across ICCs, it should be weighted. Otherwise, the un-weighted indices might be useful.

With respect to the signed area (SA) indices, the female group had an advantage in responding compre-hension items. However, with respect to the weighted signed area (WSA) indices, the male group seemed to have a greater advantage. In the subtest, the un-weighted indices indicated non-uniformed DIF for almost all of the items in the ICCs compared. In this subtest jump outs were observed only in the un-weighted indices (SA and USA) also. This implies that the students from different subgroups with identical levels of ability have unequal probability of answering the items correctly as indicated by Adams and Rowe (1988), Lim and Drasgow (1990), Mellenbergh (1989), Hambleton et al. (1991) and Raju et al. (1993).

Further, when assessing reading comprehension as a second langue, instructors should be more sensitive to the gender differences in the performance of specific reading comprehension items that favor one gender group against another, which will contribute to a fair assessment of reading comprehension as indicated by Pae (2004b). On the other hand, the design of a reading comprehension curriculum should include the information about the differential performance by gender, as reported in this study. Applying this way, teachers can take proactive steps to minimize gender differences in higher levels of thinking skills that are critical to efficient reading comprehension.

RECOMENDATIONS FOR FURTHER RESEACH

Further DIF studies can be made by including examinees coming from different school types, branches and

curricula. Statistical properties of the subtests should be examined in a more detailed way to analyze the reasons for the DIF observed in the Reading Comprehension subtest and special emphasis should be given to analyze whether selection decisions are affected by DIF or not.

Conflict of Interests

The author has not declared any conflict of interests.

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Appendix A: Examples of test items

PART 3: READING COMPREHENSION

Choose the option which best completes the meaning of the following paragraphs. Then fill the correct space on your <u>answer sheet</u>.

A.   Questions 1-5 (5 points)

1.   Water is the simplest compound of hydrogen and oxygen, elements that are essential to all living things. The body is made up of about 70 percent of water, with certain tissues such as the grey matter in the brain containing up to 85 percent. _____. And in return, it transports waste to certain parts such as the liver, kidneys, lungs and skin to be eliminated from the body.

a.   This can result in disorientation, hallucination and eventually death
b.   Water also comprises 80 percent of blood, which takes food to the tissues
c.   Water acts as the medium for all chemical processes that take place in the body
d.   Every day, the body loses around 2 litres of water just through breathing alone
2.   Over half of the world's rain forests are in South and Central America. _____.
There are over 40 different types of rain forests, each with its own variety of plant and animal life. The largest rain forest in the world is in South America. It is almost as big as Australia.

a.   All around the world, large areas of rain forest are disappearing
b.   Unless there is a change, there will be no rain forests left by the year 2050
c.   The remainder can be found in Africa, Asia and Australia
d.   People all over the world use rain forest products

3.   Gymnastics, one of the nine original sports of the first modern Olympics, is highly competitive and demanding. _____. By doing so, they can ensure fitness, strength and stamina. To become a top-class athlete is a real achievement and requires years of dedication.

a.   As a result, it is essential for would-be gymnasts to start training at a very early age
b.   The best known competitions are the world championships and the Olympics
c.   Gymnasts try to achieve excellence by performing a combination of these difficult moves
d.   Therefore, the precision of every movement is vital as the slightest mistake counts
………………………………………
………………………………………

Full Length Research Paper

Primary school teachers' vıews about supervisional deviant behaviours

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This research examines supervisional deviant behaviours depending on the primary school teachers' view in Izmir, Turkey. Organizational or workplace deviant behaviours have been studied in number of studies and these types of behaviours are determined. It is obvious that solving the problems of orgaizational deviance contribute to meet organizational objectives. Since the supervision process which aims at revealing the realization level of organizational goals is one of the important part of organizations, determining and solving the problems of supervisional deviant behaviours can also contribute to meet the targets. Therefore this study is organized to determine supervisional deviant behaviours in supervision process depending on the primary school teachers' opinions. Qualitative research was conducted in this study. Extreme-end sampling was used as a procedure of data collection. MAXQDA10.1 data analysis programme is used to anlayze the data. According to research findings supervisional deviant behaviours are observed in Turkish primary schools and supervisional deviance is influenced by three themes namely "supervisors' individual deviant behaviours", "deviant behaviours resulted from supervisors inabilities" and "supervisors unethical deviant behaviours". Consequently, educational system should take some measures to overcome the negative effects of supervisional deviant behaviours for better learning outcomes.

Key words: Organizational deviance, supervisioanl deviance, primary school teachers' views.

INTRODUCTION

Organizations prefer to work with qualified workers in order to meet their objectives. Therefore, they can strengthen themselves. It is undesired situation that the organization is working out of their aims and workers violate the processes at the workplace. These undesired behaviours have attracted researchers' attention under the title of workplace deviance or organizational deviance. Deviant workplace behaviours are defined "as

voluntary bahavior that violates significant organizational norms and, in so doing, threatens the well-being of the organization or its members or both" (Robinson and Bennett, 1995: 556).

Vaughan (1999: 273) states that "organizational deviance occurs when events that are created by or in organizations do not conform to an organization's goals or expectations and produce unanticipated and harmful

outcomes". As seen in these definitions, organizational deviance is accepted as an important threat to well-being of organizations. It has hazardous influence over the working conditions in the organizations.

Vardi and Wiener (1996: 153) prefer the term "organizational misbehavior" to "workplace/organizational deviant behaviour". They define organizational misbehavior as "any intentional action by members of organizations that defies and violates (a) shared organizational norms and expectations and/or (b) core societal values, mores and standards of proper conduct" O'Neill and Hastings (2011) accept undesired behaviours directed toward the organization as organizational deviance. "Organizational deviance occurs when counter-productive behaviors are directed toward the organization (e.g. theft, absenteeism)" (O'Neill and Hastings, 2011: 268). Deviant behaviours are understood to decline the level of productivity in any organization which produces goods or services. It may not only cause the loss of workforce but also the loss of finance which means loss of profit. Therefore it becomes a vital problem which should be tackled with seriously.

As mentioned above, there is not a common definition of organizational deviance in the related literature. Robinson and Greenberg (1998: 4) state that "there is no currently common definition or terminology regarding workplace deviance that is generally agreed upon" and add "numerous scholars have sought to define this construct, operationalize it and identify its boundaries."

Although the researchers study in the same field, they prefer to use different terms in order to define undesired behaviours in the workplace. Robinson and Bennett (1995) prefer the term "workplace deviance" and refer to the voluntary actions violating organizational processes. Vaughan (1999) uses the term "organizational deviance" and examines the deviance depending on whether the organizations would reach their aims and expectations. Vardi and Wiener (1996) use the term "organizational misbehavior" and accept that the deviance not only violates organizational norms and expectations but also violates social structure and communication within it.

Although different features of organizational deviance are emphasized by different researchers, it refers to voluntary actions which violate healthy organizational processes. Organizational deviance can be seen in all of the organizations and institutions which produce goods and services.
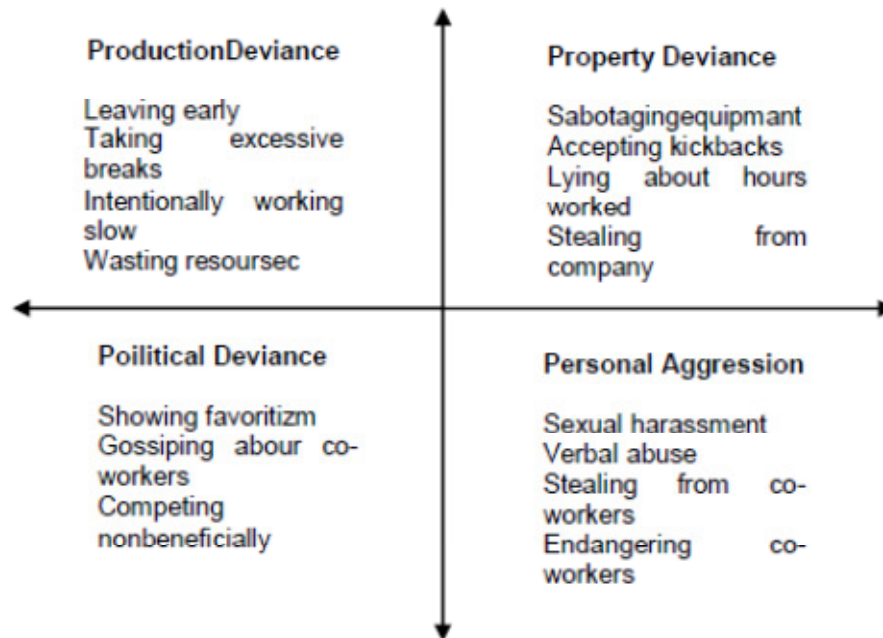
As mentioned in the explanations and definitions of organizational deviance above that these behaviours can be accepted as undesired attempts to prevent the targets. Because, the actions which refer to deviant behaviour are "sexual harassment, vandalism, rumor spreading, corporate sabotage, not following manager's instructions, intentionally slowing down the work cycle, arriving late, committing petty theft" (Appelbaum et al.,

2007: 587). Different factors can cause undesired actions within the organizations. According to Appelbaum et al. (2005: 48-50), the causes of unethical and deviant behaviours are "presence of counter norms and the effect/danger ratio, operational environment, group behaviours, organizational commitment, organizational frustration and change". Ferris et al. (2012) examine the relation between interpersonal injustice and workplace deviance and they suggest that interpersonal injustice is one of the causes of workplace deviance in any organization. Because of these reasons the administrators should take essential measures to overcome deviant behaviours. They may use group dynamics to attract the attentions for the solutions of the problems. And also, when they decide to do something, they should behave fairly among employees in order to avoid injustice.

Researchers relate organizational deviant behaviours to the concept of organizational justice. In the literature, organizational justice is defined as "a personal evaluation about the ethical and moral standing of managerial conduct" (Cropanzano et al., 2007: 35). Henle (2001: 13) explains organizational justice as "employees' perceptions of fairness in the"workplace." In addition, McCardle (2007: 9) states that "the justice framework of deviant behavior argues that individuals' perceptions and experience of organizational justice significantly relate to deviant behaviors, and that the effects of justice on deviant behavior can be influenced by a variety of organizational, contextual, and personal characteristics" McCardle (2007) concludes that when the employees encounter economic, social and emotional injustice, they perform deviant behaviours within the organization. Therefore, justice should be a key figure in the struggle against deviant behaviours. Murray (2006: 40) also points out that employees have deviant behaviours as a result of encountering unfair treatment. And he also mentions that organizational justice may have both positive and negative effects.

Robinson and Greenberg (1998: 4) suggest five characteristics for workplace deviance; perpetrators, having certain intentions, select targets, toward whom they act and consequences. Peterson (2002: 57), who studies the relation between organizational deviance and organizational climate, states that "deviant workplace behavior can be partially predicted from the ethical climate of an organization".

Robinson and Benett (1995: 565) developed "typology of deviant workplace behavior" in order to explain organizational deviant behaviours. Lawrence and Robinson (2007: 385) examine the factors of organizational deviance in two dimensions which are severity and target; "Severity refers to the extent to which the deviant act violates important organizational norms and thus is perceived as more potentially harmful to the organization

ProductionDeviance

Leaving early
Taking   excessive
breaks
Intentionally   working
slow
Wasting resoursec

Property Deviance

Sabotagingequipmant
Accepting kickbacks
Lying   about   hours
worked
Stealing   from
company

Poilitical Deviance

Showing favoritizm
Gossiping abour co-
workers
Competing
nonbeneficially

Personal Aggression

Sexual harassment
Verbal abuse
Stealing   from   co-
workers
Endangering   co-
workers

Figure 1. Typology of negative deviant workplace organızatıonal behavior. Source: Robinson and Bennett, 1995: 565.

or its members. Relatively minor forms of deviance include such behaviors as social loafing and unjustified absenteeism, whereas more severe forms might involve physical aggression or theft. The target dimension reflects whether the deviance is directed at the organization or organizational members. Organizational-directed deviance might include, for example, vandalism, theft, or sabotage". Robinson and Bennett (1995: 565) have developed "typology of deviant workplace behavior" in order to explain organizational deviant behaviours. This typology is presented in Figure 1.

As it is seen in Figure 1, organizational deviant behaviours are studied in two dimensions, organizational and interpersonal. The organizational behaviours which aim at organization are divided into two groups; production and property deviance. The undesired interpersonal behaviours are studied under these two categories; political and personal deviance. We can conclude that the first type of the deviant behaviours is directed to physical conditions or equipment which have a fundamental importance in the production process. The second type of the deviant behaviours is about the relations among employess. These behaviours may attempt to spoil the positive relations and atmosphere within the organizations.

Organizational deviance is examined within two subtitles; negative and positive deviance. Robinson and Bennett (1995), Bennett and Robinson (2000), Peterson (2002), Appelbaum et al. (2005); Lawrence and Robinson

(2007), Ferris et al. (2012) have studied negative effects of organizational deviance. According to these researchers the behaviours in Figure 1 are negative organizational deviance and these behaviours are seriously harmful to both the organization and its employees. The common effect of these behaviours is to prevent the organizational goals and expectations which may cause the loss of power and finance and profit. In this case, the employees may lose their jobs.

Some researchers suggest that organizational deviance has positive effects. Spreitzer and Sonenshein (2004) point out that deviance traditionally refers to negative behaviours and this term is used in order to mean negative effects of workers but they also explain that workers are doing extra things which have positive effects on the organizations. Spreitzer and Sonenshein (2004: 828) express that "although the study of such negative behaviours is an important scholarly endeavor, research on deviance is an unnecessarily narrow area of study". Positive organizational deviant behaviours are voluntary, purposeful, departed from unit/organization and honorable (Spreitzer and Sonenshein, 2004: 842). Appelbaum et al. (2007: 589) point out that positive deviance may be classified as "pro-social type of behavior" such as organizational citizenship behaviors. As it is known, these types of behaviours develop positive climate within the organizations since the workers act voluntarily without the limits of procedures. Therefore organizations try to reduce negative behaviours by

supporting the ones that promote the organization. "Organizations are obviously better off when helpful behavior is optimized and harmful behavior minimized" (Lee and Allen, 2002: 132).

Crom and Bertels (1999: 164) have studied positive deviant behaviours and they determine the basic logic of this type of behaviours:

1. Under equal conditions and within the same culture, some members of the community do a lot better than others.
2. Identifying these people and the principles they apply provides the background to distill the principles of success within this culture.
3. In different communities there might be different success models. Focusing on a single model is not different.
4. Using these individuals and their own cases to educate the remaining community members is much more successful than using external experts.
5. Leveraging the experience of the participants' application of this training can fuel next round of training and helps develop community members into change leaders. However, it is key to replicate the process of discovering successful behaviors, not simply best practices.

The information presented above reminds us of the concept of organizational citizenship behavior. "Organizational citizenship behavior (OCB) refers to organizationally beneficial behaviors and gestures that can neither be enforced on the basis of formal role obligations nor elicited by a contractual guarantee of recompense" (Somech and Ron, 2007: 40). As it is seen, both positive deviant behaviours and organizational citizenship behaviours refer to workers' volantary behaviours which are not required formally on the behalf of their organizations. However, Spreitzer and Sonenshein (2004: 836) make a distinction between positive deviant behaviours and organizational citizenship behaviours; "first, whereas OCBs reflect behaviors that could not be enforced by the organizations in terms of formal role expectations or job requirements, positive deviance involves a departure from the norms of referent group. Second, although OCBs are intended to improve organizational functioning, positive deviance may or not improve organizational functioning. Third, although OCBs are minor in magnitude, mundanea and common, positive deviance represents a more substantial departure from norms."

Aim of study

Organizations which want to reach their aims effectively at the target time should control and manage organizational deviance. Determining the reasons of

organizational deviance behaviours are not only important in producing goods and services but also they are important in the process of supervision which is used to understand the realization level of organizational goals. This is because, the aims of the supervision are to determine the realization level of organizational goals, to take necessary precautions in order to get a better result and to improve process (Aydın, 2007: 11). The process of supervision takes place in schools in order to determine realization of educational goals and the most important aim is to improve teaching and learning process. Aydın (2007: 37), who calls supervision at schools as instructional supervision, defines instructional supervision "as to contribute teachers' professional development by determining the problems and solving them in a positive attitude."

There is no doubt that supervisors are at the center of supervision process at all types of schools. According to Taymaz (1982: 3-4) the basic roles of supervisors are leadership, management, counseling, educator, searching and investigation. The success of supervision depends on these roles. Therefore, when the behaviours required by these roles are not performed, supervisional deviance can occur. Determining supervisional deviant behaviours and decreasing negative effects of these behaviours would improve supervision process. It would be helpful to develop instructional and educational goals at schools.

Because of these reasons mentioned above, the aim of this study is to define supervisional deviant behaviours in supervision process according to the primary school teachers.

METHOD

In this study, primary school teachers' opinions were sought in order to determine supervisional deviant behaviours. Therefore, descriptive analysis which is one of the qualitative research methods and provide opportunities to understand all of the dimensions of social events and facts (Yıldırım and Şimşek, 2013) is used in this study. It is known that descriptive analysis presents important clues to understand the reasons of social events and facts. This study aimed at presenting a descriptive and realistic picture of the problem.

The participants

In this study, extreme end sampling, which is one of the qualitative research methods, is used. Extreme end sampling can provide a richer data than normal situtations and can help to understand research problem in detail (Glesne,2012; Yıldırım and Şimşek, 2013). When the participants were chosen, the frequency of supervision represented extreme end. Because of this, the primary schools in Buca Distrcit, Izmir Province, were grouped according to their socio economic development. One primary school in upper socio economic group and another in lower group were chosen and ten teachers were interviewed from each school.

Data collecting tools

A semi-structured interview form was used in order to collect the data in this study. A conceptual framework about supervisional deviance was gathered from the literature of organizational deviance to prepare the interview form. The items which were supposed to be in the interviewform were listed and a sample form indicating three questions were prepared depending on the expert view.

Interview form

The interview form included three questions about supervisors' negative individual behaviours, their negative opinions and behaviours about National Education Organization and their unethical behaviours. These questions were;

1. Do the supervisors have negative individual behaviours such as subjective decisions, lack of trust, doing something without any plan during the supervision process? If your answer is "Yes", what types of behaviours do they perform?
2. What types of negative opinions and behaviours do the supervisors have about National Education Organization, the schools in which they work for supervision, the teachers they supervise (such as gossiping about schools and teachers or not obeying the principles of supervision)?
3. What types of unethical behaviours do supervisors have (such as threatening, accepting a bribe, harrassement or mobbing)?

When the questions in the interview form can be understood by the interviewees clearly and completely, the interview is more effective (Yıldırım and Şimşek, 2013). That is why, an expert opinion was asked in order to correct the grammatical mistakes in the outline of the interview form. Then a piloting interview was organized in order to test whether the interviewees could understand the question items clearly. The teachers' views were analysed by using descriptive analysis.

The participants were interviewed in a separate room away in order to establish a proper communication. The interviews took place between 20th-24th April 2014. The interviewees did not let us do audio recording. Therefore, we took notes during the interviews. The notes were typed in Microsoft Office Word and then they were examined in Maxqda 10.1, which is a descriptive data analysis parogramme.

Data analysis

According to the results of Humble (2012)'s research, depending on the journals of Family and Family Psychology, qualitative data analysis software is used in 23.2% of qualitative studies (Lewins and Silver, 2007). The programmes Nvivo, Atlas.ti ve Maxqda, which are defined as three leaders in the field are used in these kinds of analyses. Qualitative data anlaysis programmes help reseachers to organize the data. Therefore, these programmes accelarate to form systematic information process (Johnson, 2014). In this study, Maxqda 10.1 data analysis programme was used for searching, marking, making connections and organizing the data.

The steps which are defined by Allen (2015) were followed during the qualitative anlaysis and presenting of the results. At the beginning of the analysis all the data were examined in detail and the first codes emerged. For example, as the first step, the following are teacher views; "they are patronazing" (f=11), "they are not constructive" (f=11) and "they ignore suggestions" (f=1) were coded

as a category. Because of these codes, we concluded that some deviant behaviours resulted from supervisors' negative individual behaviours. Therefore, the theme "supervisors' individual deviant behaviours" emerged. The techniques of "open coding" and "focus coding" which are explained by Goldberg and Kuvalanka (2012) are used during the coding process. The best views which explained the categories and themes were presented in italics and quotation marks in order to give the reader a sense of being there and to present a powerful proof (Pratt, 2009).

Validity and reliability

The criteria which are defined by Burns (1989) were applied in order to support the reliability. This criteria is "descriptive vividness", "methodological congruence", "an alytic preciseness", "theoretical connectedness", "heuristic rele vance". The reliability refers to the principle that the research has similar outcomes when it is repeated in similar settings. That is why the characteristics of the research group, determining the group, and the steps of data analysis are clearly presented. The researchers analyzed the data twice on the computer in order to provide the researcher with reailibility. The themes and categories which were determined by the researchers were examined by another researcher and the reseachers had an agreement on them.

In order to ensure the validity, the criteria which were determined by Miles and Huberman (1994) were taken into consideration. The research questions depended on a detailed theoretical background and an expert's view was sought in order to provide validity. And then, the piloting proved that the questions were proper for the aims of the study.

FINDINGS

After interviewing primary school teachers, the themes and categories related to supervisional deviance were determined and their frequencies are presented in Table 1.

As it is seen in Table 1 supervisioanl deviant behaviours are grouped under 3 themes according to their frequency values.

Supervisors' ındividual deviant behaviours

According to the results of data analysis, supervisors' individual deviant behaviours are observed in primary schools at the highest frequency level (f=112). Whereas these types of deviant behaviours are not related to supervisors' duties, they are explained by supervisors' personalities. Therefore, these actions are called individual deviant behaviours within the framework of this study.

The frequency distribution of supervisors' individual deviant behaviours is presented in Figure 2.

As it is seen in Figure 2, the teachers, both from the lower group school and upper group school, state that; supervisors have arbitrary decisions (upper group f=9; lower group f=10) and they are not constructive (upper group f=6; lower group f=5). This finding indicates that

Table 1. The themes and frequency values of supervisional deviant behaviours.

Supervisional deviance		
Supervisors' individual deviant behaviours (f=112)	Deviant behaviours resulting from supervisors' inabilities (f=17)	Supervisors' unethical deviant behaviours (f=53)
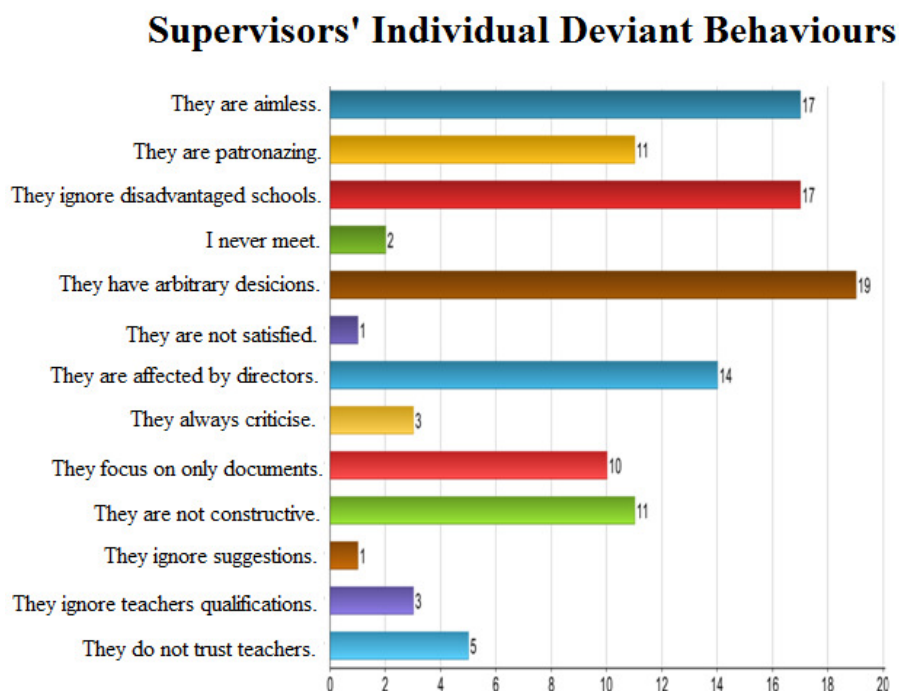
Figure 2. The frequency distribution of supervisors' ındividual deviant behaviours.

the participants agree on these specific deviant behaviours.

The teachers working in upper group school express that supervisors are aimless (f=13) and they are under the influence of school directors (f=11). The teachers coming from lower group school do not mention this deviant behaviour much since their fundamental concern is to work in a disadvantaged school.

All of the teachers (f=17) working in the lower group school agree that supervisors' work does not concern the problems of disadvantaged schools. None of the teachers from the upper group mentioned this issue.

The teacher views which support these findings are presented below:

"The supervisors give a score for our teaching performance." Two years ago, a supervisor gave me 95. The same supervisor graded me with 85 the next year. So, is this fair? The same teacher, the same supervisor and the same class, what is the difference? Why does he

behave differently? There is no scientific explanation. These are arbitrary decisions" (Lower group school, arbitrary decision C3).

"They are not constructive and they have a rude manner (Upper group, not to be constructive V7).

"When they come to the classroom, they may ask some questions which are not included in the schedule or they may want to get information on the teaching subjects (Upper group, being aimless V1)

"They are under the influence of school directors. Supervisors and directors have close friendships. So their decisions are not fair" (Upper group, directors' effects)

"Supervisors do not care about differences among schools. They believe every school has the same teaching facilities. As every school is the same, every teacher is the same. They try to shape us. Supervisors should understand that disadvantaged schools have a lot of problems. Our students are coming from lower economic income level. So, their only concern is to help their family budgets. They work after school. And most of

them use drugs. How can a teacher organize teaching activities with these students? But supervisors ignore these conditions. They compare our school to a school which is located in a good environment" (Lower group, ignoring disadvantaged schools, C2).

Deviant behaviours stemmed from supervisors' inabilities

The sub-categories do not occur under the title of deviant behaviours resulted from supervisors' inabilities in data analysis. So, a graph can not be presented in this theme. The frequency value is 17 in this theme. The deviant behaviours in this theme are about supervisors' education, professional abilities and working styles. Although they have a duty of supervising the teachers, they may not follow the recent improvements in their fields. In addition, they may not have a democratic attitude towards teachers. The sample deviant behaviours about supervisors' qualifications are presented below:

"First of all, how are supervisors appointed? We should consider it. I have been working for 37 years as a primary school teacher. So, I have seen many supersivors so far. My close friends have been appointed as a supervisor, too. In the past, a teacher who wanted to be a supervisor, attended four years university education again. They knew this job very well. They were qualified in teaching and supervising. They really helped the teachers a lot. However, this system is not carried out now. Experienced teachers are having so called exams. These kinds of supervisors are a real problem. They do not like teaching or are not successful in this job. They can not teach. So the students and their parents do not like these types of teachers. And then they want to be supervisors. Since they are not qualified teachers, they can not be qualified supervisors" (Upper group, V4),

"Supervisors do not know how student centered education can be organized. They are not aware of methods of student centered education. And then they want teachers to use these types of methods. And also they do not have any idea in order to use IT in the classrooms. When we use IT in our classes, they are against it since IT is not included in the schedule. They are not qualified enough in today's technological world" (Lower group C3).

Supervisors' unethical deviant behaviours

As a result of the data analysis, supervisors who are working with primary school teachers behave unethically. The frequency value is 53 in this theme.

The frequency distribution of supervisors' unethical deviant behaviours is presented in Figure 3.

As it is understood from Figure 3, primary school teachers agree on that supervisors behave politically (f=16). The teachers from upper group school complain about this deviant behaviour more than teachers from lower group school (upper group f=11; lower group school f=5).

Other finding that can be obtained from the graph that supervisors are not objective and the teachers perceive their decisions are subjective. Almost all the teachers who are working in the upper and lower group school have common ideas about this deviant behaviour (upper group f=8; lower group f=6).

Another unethical behaviour is to threaten (f=9). However, teachers from upper group school emphasize threatening behaviour more than teachers from lower group schools (upper group f=6; lower group f=3).

Demoralizing is another supervisional deviant behaviour for primary school teachers. Only the teachers coming from lower group school mention this type of behaviour (f=7).

The teachers' views which support these findings are presented below:

"In my opinion they are political people because supervisors are appointed by the ruling party. So, they are helpful for the teachers who support the same political party. These teachers always get the highest scores in the process of supervision." (Upper group, V1)
"Supervisors are not objective. They decide considering their political preferences. That is too bad for education. They use the process of supervision as a penalty for the teachers who do not suppoprt the ruling party" (Lower group, C5)
"Supervisors threaten teachers. When the teacher does not accept supervisor's decisions, the supervisor threatens to start investigation process about the teacher." (Lower group, C3)
"Supervisors always complain about us. They never approve our teaching methods. So, they demoralize us. (Lower group, C8)

DISCUSSION AND CONCLUSION

In Turkey, the current educational supervision procedure does not have any positive influence to improve teaching. When we consider the findings of this research, we can conclude that educational supervision focuses only on controlling and monitoring. Supervisors do not support and guide the teachers to find new teaching techniques or to be more creative during the class activities or to solve their problems. They only want the teachers to follow the schedule which is prepared by the Ministry of Education. Following the schedule is a kind of procedural acitivity dealing with preparing documents which has not any effect in the teaching process in classrooms.

Supervisors' Unethical Deviant Behaviours
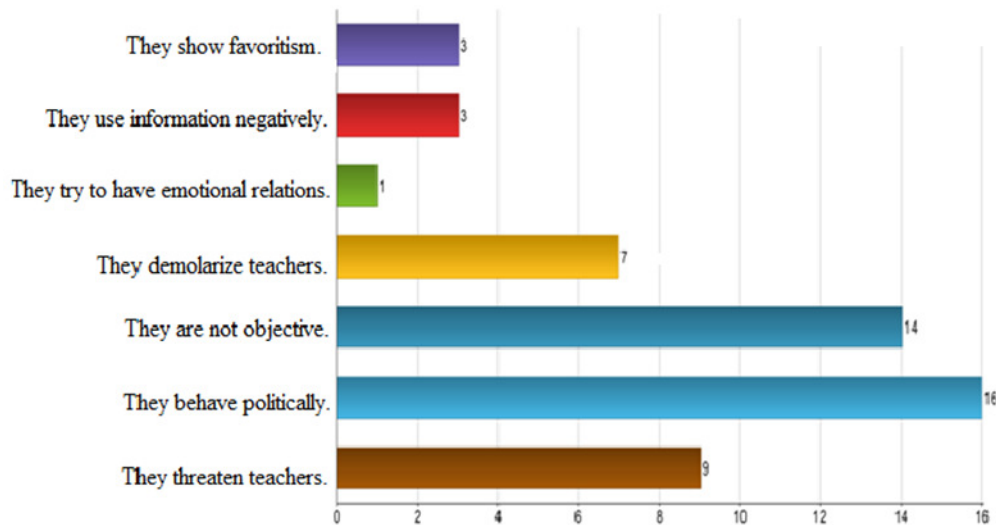
Figure 3. The frequency distribution of supervisors' unethical deviant behaviours.

Therefore, both the system as a whole and the teachers can not benefit from the supervision process.

Generally, educational supervision and supervisors are essential to improve standards of education and teaching techniques. Supervisors are supposed to solve teaching problems and contribute to teachers' development (Aydın, 2007: 21). However, according to primary school teachers' views, supervisors can not meet these needs. So supervisional deviant behaviours emerge. The reasons of supervisional deviant behaviours for primary school teachers are supervisors' individual behaviours, unethical behaviours and professional inabilities. Therefore, supervisional deviant behaviours are necessary to be observed. The reasons for them should be explored for relevant solutions.

Educational supervision is such a broad field that it is impossible to handle all the problems within the framework of this limited study. Supervisional deviant behaviours are mostly individual deviant behaviours (f=112). These negative behaviours listed as not working according to the aims, paying attention to documents a lot, having arbitrary decisions, behaving under the influence of directors and not behaving constructively. Teachers do not know how the supervisors evaluate their professional performance and development. Because, as it is mentioned above supervisors' decisions depend on different variables which are not related to educational targets. Supervisors' individual deviant behaviours affect teachers' opinions and they develop negative attitude to supervision and supervisors. So that, they do not try to find ways to benefit from supervisors' experiences or to consult them for a career development.

When we evaluate supervisors' behaviours as organizational deviance, we conclude that supervisors perform political deviance most of the time. Political deviance is the behaviours which are defined "as engagement in social interaction that puts other individuals at a personal or political disadvantage" (Robinson and Bennett, 1995: 566). According to this definition, the behaviours such as behaving politically, being subjective, demoralizing, favouritism and arbitrary decisions can be accepted as political deviance. On the other hand, the supervisors' behaviours such as being aimless and paying attention to the documents may be included in production deviance that is defined as "behaviors which violate the formally proscribed norms delineating the minimal quality and quantity of work to be accomplished" (Hollinger and Clark, 1982: 333). When the supervisors have lack of aim, they do not know how to help and guide the teachers. Therefore, educational quality can not be improved. Injustice and inequity which are among the reasons of organizational deviance cause deviance in the process of supervision according to the primary school teachers' views. Most of the teachers point out that supervisors are not fair and objective (f=14). Ferris et al. (2012) suggest that interpersonal injustice causes employees to engage in deviant behaviours. The effects of injustice are observed in the supervision process, too. Supervisors' unfair behaviours cause lack of motivation and dissatisfaction among teachers.

Supervisors' attitudes and behaviours are vitally

important in the educational supervision. Just because of this, appointment of supervisors and their supervising training (pre-service and in-service training) should be carried out carefully. Their training programmes should include modern education approaches and methods. They should also learn information technologies, which is one of the essential pre-requisites for development. The best teachers should be appointed to supervising and they should be trained according to the needs of modern education which mainly requires the ability of critical thinking and creativity in the information age.

In today's educational settings, the overall system needs the supervisors who are creative, objective and talented in teaching. Because of these qualifications we need a mental renovation in the supervision process besides effective supervisor training. The supervisors should change their point of views and working styles. Since the teachers need guidance based supervision instead of controlling based one.

As it is seen in this study that organizational deviance and supervisional deviance have similar reasons and sources. This research is a beginning point for further studies about supervisional deviant behaviours. Studying all of the aspects of supervisional deviance is beyond this research. Supervisional deviance should be studied more in different teaching and learning settings at all educational levels. When the reasons of supevisioanl deviance are clearly determined, the methods can be improved in order to solve the problems of supervisional deviance.

Conflict of Interests

The author has not declared any conflict of interests.

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Full Length Research Paper

Investigation of high school students' reading compherension levels according to various variables

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The purpose of this study is to investigate the level of reading comprehension of high school students in their fields of study and learning strategies to explain the relationship between the level of reading comprehension. This working group is composed of 11th grade high school students. In this study, relational model was used. In the study group 155 male and 85 female students are included. Öztürk's "General Learning Strategies Assessment Scale" developed by the researcher and "Reading Comprehension Test" was used to collect data. According to the findings, no significant differences were found in high school students' reading comprehension levels of gender. Students' achievement and learning strategies and significant relationship were found between the levels of reading comprehension.

Key words: Reading comprehension, learning strategies, achievement, gender, branch.

INTRODUCTION

Language is the most important means of communication between people. Human beings transfer their emotions and ideas, knowledge to others through language, which is a system of symbols. The effort and requirement to communicate, which starts with transfer, draw attention to language, especially to native language. However, effective communication is possible when language is used effectively.

Using language effectively depends on developing comprehension and expression skills considering learning strategies. Therefore, four major language skills, which are reading, listening-monitoring, speaking and writing, are used in both language and native language teaching in order to achieve this purpose. This is because they will help students see events that they experience and observe from different perspectives: they will develop their decision making, problem solving, critical thinking competence and make them social individuals. For this reason, it is necessary for students to acquire reading, listening-monitoring, speaking and writing skills and use them strategically.

Teaching native language and developing language skills are the issues which are emphasized sensitively and are becoming important increasingly in the education of students. Since recent researches have prompted new developments in language skills area, especially in reading, they have also raised the importance of courses providing native language teaching (Polloway and Smith, 1992: 7).

It is not possible to separate language skills at issue

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and learning domains from each other with certain lines because these domains affect and complete each other in learning process. However, when language teaching is considered as two general and comprehensive skills, that is comprehension and expression, it is possible to say that comprehension occurs depending on reading and listening-monitoring, and expression is required as a result of it.

When it is considered that comprehension is one step ahead of expression, the significance of reading and reading comprehension will be better understood.

Reading and reading comprehension

Reading which has an effective role in learning and using a native language has been defined in various forms. Tazebay (2005: 4) thinks that "Reading is a complicated activity including various movements of eyes and speech organs and the effort of the mind to understand". Öz (2006) expresses reading as "grasping meanings of word forms by seeing in consequence of eye shifting on lines and vocalising them" Besides, it is possible to express reading as "the process of seeing, comprehending and grasping a writing with its words, sentences, punctuation marks and other components," (Kavcar et al., 2005); " a dynamic process of getting meaning which makes the active and impressive communication between an author and a reader necessary" (Akyol, 2006); "getting information from a text and explaining information by structuring" (Grabe and Stoller, 2002).

As it can be understood from these definitions, reading is not only an activity of vocalizing written symbols according to certain rules. In addition to vocalization, reading also means perceiving, comprehending emotions, ideas and messages in a text. If a meaning is not extracted from a text, a comment is not made on the text; it is not possible to assess it as a complete reading.

Elaboration of a text is possible through mental operations that a reader performs at each stage of reading. According to Smith and Dechant, reading comprehension skill consists of the following components:

"1. Relating graphic symbols, that is writing, and their meanings,
2. Giving appropriate meanings to the words in accordance with general content of a text,
3. Comprehending the meanings of idioms, sentences, paragraphs, and whole text hierarchically from part to whole and binding parts and the whole,
4. Evaluating what is read, understanding purpose and mood of an author,
5. Associating opinions in a text with past experiences" (Akt.: Dökmen, 1994:25).

In Turkish curriculum, reading is also defined as a

process and it is described as a sophisticated situation consisting of various functions of eyes, voice and brain such as seeing, perceiving, vocalizing, comprehending, structuring in brain (MNE, 2006: 6). Students are expected to acquire reading comprehension skills at primary school level, whereas these skills are aimed at becoming high-level skills at high school level. That is why the expression "To comprehend and use skills of reading texts and passages accurately and well, understanding correctly and interpreting" is included in 9th, 10th 11th and 12th Grade Language and Expression Course Curriculum (2011: 2). Again, in the same curriculum, how and why units of language construct a new meaning around a message at a wider and higher level; the relationship of language unities with each other within this meaning are emphasized through practices performed on texts and passages (2011: 2). Accordingly, the idea that understanding and grasping structures to form a text with paragraphs in terms of "expression, structure, meaning and main idea, ways to support an idea" as inevitable for reading comprehension is emphasized especially in the paragraph chapter of the curriculum.

When it is considered that Turkish Literature and Language and Expression courses at high school complete each other, Turkish Literature course is expected to support reading comprehension studies as well. Although there are no objectives or attainments directly based on understanding a paragraph and a text in the course mentioned here, the investigations conducted on the importance of Turkish literature are those things converted into practice in Language and Expression course. Then, texts belonging to different eras are examined through text analysis and students are expected to be able to comprehend these texts. This reading effort must be at a higher level in comparison with reading at primary school level for both text and students' development. Robinson and Good (1987:145-146) think that reading comprehension is divided into 3 categories as literal comprehension, interpretive comprehension and critical comprehension.

1. Literal comprehension: it includes skills such as locating the information, collecting information, following the steps, determining characters, determining setting, following instructions, explaining author's structural design.

2. Interpretive Comprehension: It includes skills such as determining the main idea, selecting significant ideas, organizing ideas, developing concepts and principles, summarizing, testing outputs and effects, comprehending implied meanings, generalizing, determining relationships, forward looking predictions, determining what is significant and related, comparing information, deter-

mining applications, performing implementations, determining an author's purpose, tendency and motivation of characters, being able to enjoy, determining opinion and tendency of an author, completing an idea belonging to an author, comparing the setting with other settings, integrating the setting with personal experiences, forming emotional images, composing emotional responses, restructuring what is read, reading by considering spelling, drawing conclusions.

3. **Critical Comprehension:** It includes skills such as comparing what is read in terms of quality, value, accuracy, reality, partisanship, consistency, propaganda, relevance, sufficiency, reality or opinion; evaluating purposes and attitudes provided by the author; evaluating the subject in terms of surroundings;   evaluating the language in the surroundings; evaluating the general structure of the surroundings; evaluating author's expertise and information resources.

It is necessary to benefit from the following methods in order to achieve the steps of reading comprehension given above:

1. To determine the theme discussed in writing,
2. Detecting words whose meaning are not known, sentences and paragraphs which are not understood,
3. To determine the main idea,
4. To discover associate ideas,
5. To determine general mentality and wording of the text,
6. To decrease reading speed when the text is not understood (Demirel and Şahinel, 2006: 89).

These methods are the factors which need to be done in order to grasp the reading material because reading comprehension is the expected goal of reading process. The methods to be used in reading comprehension and the steps of reading comprehension are also related to an individual's prior knowledge, acquaintance with the theme, culture, life experiences, individual interpretation of expressions and words. Since each of these factors varies from person to person, reading experience is special to the individual (Carter et al., 2002: 136).

Reading comprehension is considered to be an integrated process requiring effective and conscious cognitive effort on a reading text. In this interactive and dynamic process, prior knowledge and experiences of a reader, his/her reading purposes are also as important as text type and nature (Kent, 2002: 22).

Students having difficulties in reading comprehension may experience problems in almost all studies conducted by a teacher, especially in comprehending and answering the questions in tests. When this situation is taken into consideration, the significance of strategies improving reading comprehension stands out.

Learning strategies

Strategy means someone's approach to a task or a situation. Learning strategies are techniques, principles or habits that enable students learn independently and on their own. The techniques, principles or habits mentioned here focus on how students will think and act when they plan and perform their learning tasks and evaluate results and performances (Katims and Harris, 1997).

Derry (1989) thinks that a plan developed and used by an individual in order to achieve a learning goal while performing a learning task is the learning strategy of that person. These strategies can be simple or complicated, logical or illogical. What is important is choosing a strategy appropriate for the learning task.

Nannette and Branda (1995) defined learning strategies as cognitive activities keeping students awake and affecting their success at all levels in order to increase comprehension and remembrance of knowledge. According to Nist (1993), learning strategies are the processes of reading, writing, listening, practising and critical thinking.

Weinstein and Mayer (1986) classified learning strategies in detail and they determined these steps through sample learning situations. In consequence of their research, they developed a classification consisting of 8 groups. In general terms, the strategies are examined in two groups as comprehensive group and simple group. When they are detailed, a classification appears as in the flowing. They advocated that one or some of these strategies must be selected in accordance with the trait of an individual's learning situations.

These strategies are;

1. Basic rehearsal strategies,
2. Sophisticated rehearsal strategies,
3. Elaboration strategies,
4. Sophisticated elaboration strategies,
5. Basic organization strategies,
6. Sophisticated organizational strategies,
7. Comprehension monitoring strategies,
8. Affective strategies,

The learning strategies mentioned above were developed depending on general cognitive models dealing with learning and information processing. Plitrich et al. (1993) believe that cognitive models and learning strategies are necessary for students to process the information they obtain from a text or a course. Appropriate strategies among basic and sophisticated strategies must be used in order to achieve the mentioned learning. Among these strategies, the simple or basic one is the remembrance or rehearsal strategy. This strategy is based on rehearsing words and sentences helping remember knowledge. Sophisticated ones are elaboration and organization

strategies. Elaboration strategy includes activities such as summarizing, extracting significant points; whereas organization strategy includes learning activities such as making a draft and schematization. Comprehension monitoring strategies lead individuals to choose the most suitable strategy, use, monitor the process and rearrange after evaluation in performing a learning task. Affective strategies, on the other hand, help in removing the obstacles based on motivation and sentimentality. It is possible to employ affective strategies in order to remove or minimize the obstacles observed in students such as distractibility, having negative attitudes, having text anxiety (Sünbül, 1998).

For an effective learning, an individual should take learning responsibility and join learning effectively. Fulfilling learning successfully depends on using the most appropriate strategy. Starting with primary education, an individual must obtain knowledge and skill related to learning strategies. Thus, it is provided that individuals can both be more successful in their courses in formal education and improve themselves after formal education. It is thought that which strategy or strategies is used/are used is related to reading comprehension and success accordingly. While competence of reading comprehension is observed at various levels in students using different learning strategies, there are also researches displaying that there is a relationship between competence of reading comprehension and courses (Bloom, 1995). Bloom (1995) determined that there is a relationship between reading comprehension competence of students and their success in maths, physical sciences, and language and literature lessons. In the results of this study, it is not expected that individuals who fail in reading comprehension will be interested in other course subjects, comprehend their course books and be successful accordingly. In this sense, considering the importance of reading comprehension and its relationship with strategies, students must determine their learning strategies, know their own learning processes.

An individual must use a learning strategy or strategies in which s/he can be active in reading comprehension and learning process and which is/are shaped according to him/her. However, another issue which needs to be determined is whether reading comprehension levels of an individual differ depending on different strategies.

In this study, the relationship between learning strategies of students and reading comprehension was tried to be interpreted. Based on whether a learning strategy used by students predicts comprehension or not, the significance of learning strategies and the necessity of raising awareness about this issue will be remarked.

The purpose of this study is to examine reading comprehension levels of high school students in terms of gender, their field of study and student success, and to explain the relationship of learning strategies with reading comprehension. For this purpose, we searched for answers to the following questions:

1. Does reading comprehension competence of high school students differ meaningfully by gender?
2. Does reading comprehension competence of high school students differ meaningfully by their field of study?
3. Does reading comprehension competence of high school students differ significantly by the condition of receiving certificate of achievement?
4. Is there a considerable relationship between high school students' success and their reading comprehension levels?
5. Is there a meaningful relationship between learning strategies of high school students and their reading comprehension levels?
6. To what extent do learning strategies used by high school students predict their reading comprehension levels?

METHODOLOGY

Research model

In this research, reading comprehension levels of high school students were investigated in terms of gender, field, achievement of students and their learning strategies through a comparative type of relational screening model. Relational screening models are those which try to determine the existence and degree of change between two and more variables (Karasar 1991: 81). Because most of educational problems have describable qualities, researches in screening models provide significant contributions in both theory and practice to understanding and increasing knowledge (Balcı 2001: 19-21).

Study group

This study aims to examine the variety of reading comprehension level of high school students in Turkey. Therefore the study group of this research conducted in 2012-2013 academic year by using relational screening model consisted of 11th grade students from 4 different types of high schools from Konya City centre. Students from Selçuklu Industrial Vocational High School, Enderun Anatolian and Science High School, Muhittin Kılıç High School and Meram Trade High School from Konya city centre were included in the research. The research group consisted of 155 males and 85 female students, 240 students in total. The reason is in a different school to work is to evaluate the students in terms of the different levels of reading comprehension.

Data collection tools

In the research, characteristics of students included in the sample were collected using Individual Information Form and the data related to the solution of the research problem were gathered using "General Learning Strategies Evaluation Form" developed by Öztürk (1995) and "Reading Comprehension Test" developed by the researcher.

General learning strategies evaluation form

This scale was developed by Öztürk (1995). It is a 5-point Likert-type scale having 7 sub-dimensions and 63 sentences in total. These dimensions are the sub-dimensions of: attention strategies(1st ,2nd ,3rd ,4th ,5th ,6th items), rehearsal strategies ((7th , 8th , 9th , 10th , 11th , 12th , 13th , 14th , 15th items), elaboration strategy (16th, 17th, 18th, 19th , 20th 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th items), cognitive strategies (35th, 36th, 37th, 38th, 39th and 40th items), memory strategies (40th, 41st, 42nd, 43rd, 44th, 45th, 46th items), metacognitive strategies (47th, 48th, 49th, 50th, 51st, 52nd items) and affective strategy (53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd items) respectively. The scale measures mental strategies employed by a student in any subject. Reliability coefficients of the scale were calculated as .69 for the Attention Strategy, .78 for Rehearsal Strategy, .90 for Elaboration Strategy, .67 for Cognitive Strategy, .74 for Memory Strategy, 70 for Metacognitive Strategy, .76 for Affective Strategies. In order to determine the frequency of occurrence by each student, a five-point grading (never, rarely, sometimes, often, always) was employed.

Reading comprehension test

In order to measure reading comprehension level of the high school students attending 11th grade, a reading comprehension test including 40 questions with 5 options was developed. While preparing the test, 50 questions at the paragraph level were prepared to determine reading comprehension level of the students. Paragraph questions; paragraph topic, main idea-the idea of finding help determine the structure of paragraphs; paragraph structure of general opinion and expression of the main title has been created. Language skills courses place among basic and general purpose "Understanding text parts correctly and interpreting gain skills" (MEB, 2011: 2) expression and paragraph achievement test so that unit forming the text is prepared from paragraph questions. Questions on paragraph consisted of main topics of paragraph's theme, determining main idea-supportive idea, paragraph structure and determining the general idea of the paragraph and description structure. The questions of the test were prepared under the titles given above and three experts were asked to opine on them and 10 questions were eliminated as they were not appropriate. The validity and reliability analyses of the test were done on an experimental group which included 148 individuals at high school level. In consequence of analyses done by using Component Factor Analysis, it was observed that factor loadings of the test accumulated in a single dimension. This single dimension explains 53% of the variance in reading comprehension. Factor loadings of the 40-item test were over 0.40. Item analyses related to the items of the reading comprehension test were conducted separately. As a result of item analyses, it was determined that most of the questions had item difficulty (pj) between 0.40 and 0.60 and distinctive power coefficient of items was above 0.30. The reliability analyses of the test were calculated using KR-20 reliability method and reliability coefficient of the test was calculated as .89.

Analysis of the data

SPSS 18.0 program was used in the analysis of the data and t test, ANOVA, Post hoc comparison tests, Pearson's Moments Multiplication Correlation Coefficient and regression analysis were used as data analysis methods.

Table 1. Comparison of reading comprehension levels of high school students by gender.

Gender	N	Average	s.s	t	p
Male	155	11,11	6,220	5,578	0,000
Female	85	16,31	7,928		

FINDINGS

In this chapter, the findings collected in consequence of data analysis related to the problem of the research are included. As a result of conducted analyses, it was observed that whether or not reading comprehension levels of high school students changed in terms of gender, their field of study and achievement status. The relationship between students' reading comprehension and their learning strategies is given in the last part of the findings.

The distribution of the scores that the high school students got in the reading comprehension test is given in Table 1. This finding shows that there is a significant difference at the 0.05 level between reading comprehension levels of both genders. When score averages of the groups are taken into consideration, it was observed that female students had higher reading comprehension level in comparison with male students (Figure 1).

The data collected in consequence of comparison of reading comprehension levels of high schools students by the condition of receiving certificate of achievement are in Table 2.

In Table 2, reading comprehension levels of the students were considered by the condition of receiving a certificate of achievement. Reading comprehension scores of the groups show that there is a considerable difference according to the condition of receiving certificate of achievement. The analyses of Tukey test revealed that the high school students receiving certificate of achievement exhibited higher level of reading comprehension in comparison with those students not receiving certificate of achievement. The students receiving certificate of appreciation scored significantly higher than those receiving certificate of achievement and those not receiving any certificates.

The situation between reading comprehension levels of the high school students and their field of study (verbal, equal weight, numeric, vocational branches) is in Table 3.

In Table 3, reading comprehension levels of the high school students in terms of their field of study are given. The F value calculated on reading comprehension scores of the groups is 3,964. Reading comprehension levels by the field students study were differentiated meaningfully. According to the results of Tukey test, there were not significant differences among reading comprehension levels of the students studying in verbal and vocational
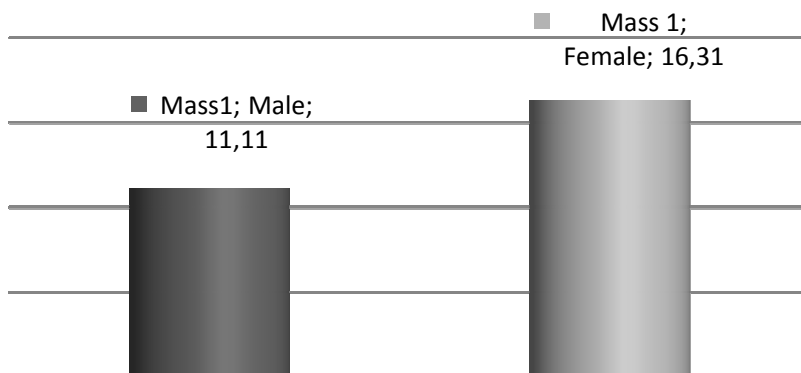
Figure 1. Reading comprehension levels of high school students by gender.

Table 2. Comparison of reading comprehension levels of high school students by the condition of receiving certificate of achievement.

	Average	N	s.s	f	p
Those receiving certificate of appreciation	15,48a	82	9,094		
Those receiving certificate of achievement	11,91b	96	5,812	11,706	0,000*
Those not receiving certificate of achievement	9,43c	62	3,476		

**p<0,05, a, b, c: There are significant differences between averages given with different letters.

Table 3. Comparison of reading comprehension levels of high school students according to the fields of study.

Field of study	Average	N	s.s	f	p
Verbal	9,50b	55	3,928		
Numerical	13,67a	64	6,308		
Equal Weight	14,25a	69	9,541	3,964	0,000**
Vocational Fields	8,50b	52	2,710		

**p<0,01, a, b, c: There are significant differences between averages given with different letters.

fields. However, reading comprehension levels of the students studying in equal weight and numeric fields are significantly higher than their peers studying in verbal and vocational fields (Figure 2).

The relationship between students' success and their reading comprehension levels is given in Table 4.

In Table 4, analyses of relationship are seen between semester grade points of the high school students and their achievement in literature lesson and their reading comprehension levels. An r value at 0.374 level was calculated between the course of literature and reading comprehension levels of students, and an r value at 0.321 level was determined between their grade points and reading comprehension levels. This finding indicates that there is a considerable relationship between two achievement variables and reading comprehension levels. It has been determined that high school students who have high grade point and are successful in literature lesson possess high reading comprehension levels.

The relationship between learning strategies of high school students and their reading comprehension levels is given in Table 5:

Pearson's Moments Multiplication Correlation coefficient technique was used to analyze the relationship between learning strategies and reading comprehension levels of the high school students in the province of
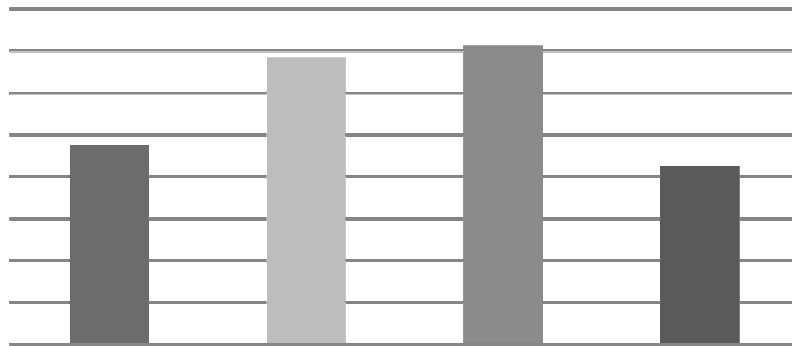
Figure 2. Reading comprehension levels of high school students according to their fields of study.

Table 4. The relationship between students' success and their reading comprehension levels.

Students' success	r	p
Turkish Language and Literature Grade Point	0,374	0,000
Grade Point Success	0,321	0,000

Table 5. The relationship between learning strategies of high school students and their reading comprehension levels.

Learning Strategies	r	p
Attention	0,131	0,043
Rehearsal	0,023	0,729
Elaboration	0,181	0,005
Cognitive	-0,002	0,973
Memory	0,094	0,144
Metacognition	0,148	0,022
Affective Strategies	0,215	0,001

Konya. A meaning positive relationship was determined between 3 sub dimensions of the learning strategies scale and reading comprehension level. There is a meaningful relationship, which is considerably high, between elaboration (r=0,181), metacognition (r=0,148) and affective strategies (r=0,215) of the high school students and their reading comprehension skills. The students employing the mentioned strategies performed high level reading comprehension.

In Table 6, the effect of all sub-dimensions of the learning strategies scale on reading comprehension levels of the high school students is given.

The effect of all sub-dimensions of the learning strategies scale on reading comprehension levels of high school students is displayed in Table 6. For this purpose, the calculated regression value for all learning strategies was found as R=0.426. This result explains a statistically meaningful effect at 0.01 level. Among high school students, learning strategies explain 18.2% of the reading comprehension variable (R^2=0.182). In other words, approximately 18% of variance emerging in reading comprehension levels of the high school students results from learning strategies.

When the effects of sub-dimensions of the learning strategies scale are considered one by one, it is seen that elaboration, cognitive and affective strategies meaningfully predict reading comprehension levels of high school students. There is a positive effect in elaboration and affective strategies, whereas the effect in cognitive strategy is negative.

RESULTS AND DISCUSSION

Depending on the findings of the current research, the following results were found:

1. A meaningful difference was determined between reading comprehension levels of high school students in terms of gender. It was observed that female students had higher reading comprehension in comparison with their male peers.

Table 6. The level of learning strategies of high school students predicting reading comprehension levels.

R	R^2	f	p	Learning strategies	t	p
				Attention	0,158	0,874
				Rehearsal	-1,771	0,078
				Elaboration	3,368	0,001*
,426	,182	7,368	0,000	Cognitive	2,168	0,031*
				Memory	0,914	0,361
				Metacognitive	1,917	0,056
				Affective Strategies	5,080	0,000*

2. Reading comprehension levels of the students varied depending on receiving certificate of achievement. In this context, the highest reading comprehension levels were obtained by students receiving certificate of appreciation and students receiving certificate of achievement respectively. Similarly, a considerable relationship was determined between students' success and their reading comprehension levels. High school students who had high grade points and were successful in literature lesson performed higher levels of reading comprehension.

3. Reading comprehension competence of students differentiated meaningfully in terms of their fields of study. Reading comprehension levels of the students studying in equal weight and numeric fields are significantly higher than their peers studying in verbal and vocational fields.

4. Meaningful relationships were discovered between learning strategies of high school students and their reading comprehension levels. A meaning positive relationship was determined between 3 sub-dimensions of the learning strategies scale, which are elaboration, metacognitive and affective strategies, and reading comprehension level.

5. When the effects of sub-dimensions of the learning strategies scale are considered separately, it is seen that elaboration, cognitive strategies and affective strategies meaningfully predict reading comprehension levels of high school students. There is a positive effect in elaboration and affective strategies, whereas the effect in cognitive strategy is negative.

The first finding of the research is that there are significant differences among reading comprehension levels of high school students with respect to gender. Female students got rather high points in reading comprehension in comparison with their male peers. In the research conducted by Lehto et al. (2001) on 9th grade students, it was observed that the levels of reading comprehension and elaboration of a given text of female students were significantly higher than male students' levels. In a research done in Finland, it was determined that female students received better results in comparison with male students on nearly all reading tests and in answers given to questions measuring reading comprehension. The data on all school types and student levels indicate a meaningful difference on behalf of female students (LinnakylaE, 1995). LinnakylaE reports that this difference might result from many reasons and LinnakylaE also claims that especially academic discipline and academic expectations of female students are effective at this point.

In this research, a considerable difference was determined between general academic achievement and grade points of high school students in literature lesson and their reading comprehension levels. These findings are compatible with the results of many researches conducted at primary school, high school and university levels (Arslan, 1996; Belet, 2005; Çiftçi, 1998; Demirci, 2003; Görgen, 1997; Tay, 2007; Talu, 1997; Uysal, 2006; Yorulmaz, 2001; Sünbül, 1998). The results of the researches conducted by Lytenen and Tetho (1998) and Murray et al. (2009) are in parallel with these findings. According to a research done by Lytenen and Letho (1998), it was reported that there was a meaningful relationship, which was quite high, between reading comprehension and academic achievement. In their research, Murray et al. (2000) determined that reading comprehension skills and habits of students were among the most influential factors on academic achievement. It was considered that the most important reason of failure of students, especially those having very low achievement level, was their weakness in this sense. From this aspect, reading comprehension skills has prerequisite learning feature for all subjects. When this prerequisite is taken into consideration, it is possible to say that learning strategies must be taught to students as a subject. Students must study in accordance with their own learning strategies and they must become able to manage and control their own learning processes.

Meaningful relationships were observed between learning strategies of high school students and their reading comprehension levels. A meaningful positive relationship was determined between learning strategies

including elaboration, cognitive and affective strategies and reading comprehension levels. As a whole, learning strategies predict reading comprehension at a meaningful level. The results of this research are in parallel with the results of the research conducted by Thomas and Rohwer (1986), Kirby (1988), Baker and Brown (1984) and Anderson (1990).

Thomas and Rohwer (1986) believe that students' strengths in grasping and comprehending are strongly affected by their elaboration processes. In a similar study, Kirby (1988) states that while competent readers join a text by making sense of words, thus grasp each important dimension of a text, incompetent readers try to identify words. To overcome this deficiency, it is necessary to help students in analyzing a text or a paragraph with respect to significant and insignificant points and in solving it structurally. Researches have revealed the differences between competent and incompetent readers (Wasik et al., 1990: 609-10). Competent readers use coding and elaboration strategies and apply to the process of information processing rather than word-by-word reading or focusing on units (Baker and Brown, 1984).These readers are purposeful readers, use monitoring process of grasping constantly, use correction exercises when they fail to grasp the meaning. Anderson (1990) thinks that the most effective two factors in reading comprehension are prior knowledge about the text and the strategies used in structuring, diagramming or giving meaning. An individual who receives a strategic training on reading comprehension can arrange and improve his/her comprehension levels (Garner and Alexander, 1990). Students using elaboration and cognitive processes actively deliver effective performances in terms of;

1. Understanding the purpose of reading,
2. Using related prior knowledge effectively,
3. Providing knowledge on a base,
4. Evaluating a reading material consistently,
5. Monitoring reading comprehension levels
6. Drawing a conclusion from a text and evaluating conclusions (Palincsar and Brown, 1984).

McKeown (1994) believes that reading comprehension level is affected by how readers structure receiving information (Katims and Harris, 1997). Particularly, when reading comprehension levels of successful and unsuccessful students are taken into consideration, it is seen that cognitive awareness differs (Duffy et al., 1997). Thus, it is necessary for students to structure and interpret available texts, materials or learning situations. It was concluded in the research conducted by Bümen (2002) that students use interpretation and rehearsal strategies most and these strategies affect achievement in some subjects. In the doctoral thesis titled "The Effect

of Learning Strategies on Reading Comprehension, Writing Skills and Attitudes Related to Turkish Language Course", Belet (2005) states that using learning strategies develop reading comprehension skills of students. In their research, Saban and Tümkaya (2008) have determined that "there is a significant relationship between learning strategies and academic achievements of pre-service teachers. The needs of students having medium and low levels of success in terms of using learning strategies must be met and they must be supported in order to develop new learning strategies and to achieve effective learning on their own."

According to another result of the research, it has been determined that learning strategies used by high school students can explain 18% of reading comprehension success. In other words, 18% of change emerging among the reading comprehension levels of high school students results from learning strategies. Elaboration, cognitive strategies and affective strategies predict reading comprehension level meaningfully. There is a positive effect on elaboration and affective strategies, whereas there is a negative effect on cognitive strategies. Similarly, the results of the research done by Üredi and Üredi indicated that the most powerful predictor variable of students' success in Math subject was use of cognitive strategy. The research conducted by Emir and Özdemir (2004) showed that learning strategies could predict academic achievement.

Suggestions

The following suggestions have been developed based on the collected findings:

1. Accomplishing learning process depends on using the most appropriate learning strategy or strategies by students. Thus, starting from early stages of formal education, students must be taught what learning strategies are, about knowledge and skills related to learning strategies. An individual must know which strategy is the most appropriate for him/her, and be self-sufficient with respect to using the right strategy.
2. Teachers must lead their students while using learning strategies. Teachers must provide their students necessary information on using implementation steps of learning strategies(analysing and identifying the target, planning a strategy, applying the strategy, monitoring the results of the strategy, making the strategy appropriate) consciously and help them in the implementation process.
3. In service training courses and seminars must be provided for Turkish Language and literature teachers in order to make them contribute to reading comprehension level of students. In addition, they must be encouraged to

use strategies oriented to students in their lessons.

4. Considering the relationship between reading comprehension skills points obtained in international exams and learning strategies, course contents must be revised depending on learning strategies which are often used by students in countries possessing high level reading comprehension skills.

5. Besides, based on exam results, curriculums must be revised in terms of variables such as book type considered to be effective on students' success, time allocated to reading, etc.

Conflict of Interests

The author has not declared any conflict of interests.

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Educational Research and Reviews

Full Length Research Paper

Application of total quality management system in Thai primary schools

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The present study seeks to develop a total quality management (TQM) system that can be applied to primary schools. The approach focuses on customer orientation, total involvement of all constituencies and continuous improvement. TQM principles were studied and synthesized according to case studies of the best practices in 3 primary schools (small, medium, and large) I Inputs were defined as (organizational leadership and organizational resources. Processes were defined as existing in five subsystems, strategic planning, student and stakeholder focus, knowledge management and measurement, staff focus, and process management. Output consisted of education towards excellence and improved performance of the students as the result of the work of subsystems. The application of TQM to improve quality of education in the school system provides a high quality gradient focusing on improvement in student performance in terms of academic achievement, key competencies and scores on achievement tests in reading, critical thinking and writing

Key words: Total quality management, school system, primary, application.

INTRODUCTION

Organizational management and development is one of the important missions of the organization to focus on improving the quality of the organization to increase competitiveness for excellence and achieve the set goals. In management of the organization, leaders must find innovative ways to develop a work system within their own organizations to increase their ability to compete. For these purposes, many organizations have adopted the concept of Total Quality to make changes and develop the organization. Initially, the concept of total quality was introduced in business and industrial organizations

(Deming, 1986; Jazzar and Algozzine, 2005; Juran, 1988, 1989; Scherkenbach, 1991; Scrabec, 2000). Its evolution began as Quality Inspection, Quality Control, a process with an emphasis on error detection or reduction to a minimum called "Zero Defect" (Crosby, 1979: 19). This concept began to change to provide Quality Assurance in the organization and more attention to customers (Sallis, 2002: 17). Total Quality Management (TQM) is a basic philosophy of creating a culture for organizational change, focusing on how to improve the quality continuously, with the participation of stakeholders and

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focus on customers. TQM is an activity that can be integrated into all parts of the organization (Pool, 2000: 37). The concept of Total Quality Management was introduced in the organizations, as a tool for building quality and management solutions to control the quality and to guide the restructuring of organizational performance to achieve organizational quality, which is beneficial to the organization as an alternative. TQM practices help an organization gain an advantage in the competition and move forward. Total Quality Management in an organization is one of several management systems based on the philosophy that, "if you are able to create products or services to the satisfaction of customers, they should come back for more ". With this concept, it is actually possible to rely on the cooperation of all personnel in the organization for behavioral modifications. The application of TQM to improving quality of education in the school system provides a high quality gradient focusing on steep-slope improvement in quality performance (Audette, 1992; Audette and Algozzing, 1992,1997; Baugher, 1992; Cohen, 1991; Downey et al., 1994; Hau, 1991; Heverly, 1992; Jazzar and Algozzine, 2005; Scrabec, 2000; Murgatroyd and Morgan, 1994). In this study, TQM is the holistic management system or holistic TQM which means everything and everyone in the organization are involved in a continuous improvement. In countries like USA and Australia, TQM has been applied to raise the quality standards for higher education.

Total Quality Management is a modern management system in the tradition of neo-liberalism. In TQM, it is important to focus on improvement and commitments to continuous quality improvement. TQM is used in education as a strategy to make continuous changes and improvement in the education system (Schomoker and Wilson, 1993). Therefore, the quality of education has to be modified and improved to make appropriate and timely changes in the globalized world. In the case of Thailand, striving to become a knowledge-based society and economy are the key reasons that the quality of education needs to be improved. For Thailand to join the ASEAN Community, all educational institutions and schools need to educate and prepare Thai youths for effective competition and cooperation. As a result, the system of education in all schools of Thailand needs to be updated with the changes. Because educational institutions are the key places to put educational reform policies into practice to achieve the goals set forth in the strategic educational reform in the second decade (2009 - 2018), it is necessary to improve the system to achieve quality by building a quality culture in schools. One process that can create a quality culture is to develop the

organizational quality management system in the management of educational institutions, thus resulting in a change management system. (Boyer, 1995; Tyler, 1949). In addition to meeting the policy of educational reform, it responds to the need for Thailand to join the countries of the ASEAN Community. In other words, Thailand has to adjust itself to compete for survival in the community. However, change requires leadership to improve the quality management system to have the organizational capacity to compete, especially the development of quality management systems in schools. If organizations do not pay attention to the dimensions of educational quality and customers (in this case, parents and teachers) do not care about the students, it is a risk to the survival of the organization. In that case, education is the key issue to turn the public's attention to the quality of the organization. This is done by developing a system with the goal of improving the performance of students so as to increase Thailand's potential to enter the competition in ASEAN Community.

Challenges

The main problems regarding Thai education capacity comprise education opportunities, quality of students' performance, and effectiveness of instruction which are unsatisfactory and low compared to previous years. The performance of Thai children has continually gone down. This can be gauged from various forms of the national standardized test known as Ordinary National Educational Test (O-NET). It was found that the scores of Thai students who took the test in 2010 were lower than 50%. Grade 9 students passed in just one subject: Health Education. The results of O-NET in 2011 showed that grade 6 students secured scores higher than 50% in Mathematics, Social Studies, Culture and Physical Education; however, their scores were lower than 50% in English and art (National Institute of Educational Testing Service, 2012). In terms of primary school assessments, the external assessment conducted by the Office of National Education Standards and Quality Assessment during 2006-2010 showed that the average value in 14 standards was satisfactory. Among the total of 12,268 Thai primary schools, 79.10% were accredited and 20.93% were not accredited. The poor performance of Thai primary schools in administration and management was indicated in the second round of external quality assessment. This poor performance was caused by the poor quality standard of student development competencies such as: critical thinking and practical capacity, problem solving abilities, curriculum-based outcomes,

learning commitments, and lifelong learning (Office of National Education Standards and Quality Assessment, 2010).

Organizational leadership

This is the most important factor affecting the performance of the organization focusing on making the aims and objectives of the activities successful and quality-oriented. Mortimore et al. (1993) proposed many essential factors as indicators of the effectiveness and quality of school, one of which is leadership of school administrators in academic administration, content guidance, and instructional strategies. Photiwat (2004) conducted research on the effectiveness of the policy of learning reforms in the Northeast primary schools in Northeastern Thailand and found that leadership and motivation directly affected the learner-centered learning approach, achievement, behaviors, and satisfaction. Thus, it can be seen that the leadership of school administrators is an important factor that affects directly and indirectly the total quality management system of a school. In other words, the school leader must have vision and determination to accomplish its mission, encourage staff and colleagues to participate and continuously improve the quality of instruction. It can be concluded that leadership refers to the ability to use relevant skills and competencies to guide and direct all participants to achieve the end results.

Organizational resources

This is the factor that affects and challenges the results of operations of the school or the effectiveness and efficiency of the school process. Steers (1977) discussed the four factors that affect and influence the organizational effectiveness as follows: 1) Organizational Characteristics (Structure, Decentralized Control, Level of Task Specialization, Formalization, Span of Control, Organization Size, Work-Unit Size), 2) Environmental Characteristics: a) External Factors covering Complexity, Stability, Uncertainty, b) Internal Factors consisting of Achievement Orientation, Employee Centeredness, Reward - Punishment Orientation, Security vs. Risk, Openness vs Defensiveness, 3) Employees' Characteristics (Organizational Attachment, Attraction, Retention, Commitment, Job Performance, Motives, Goals, Needs, Abilities, Role Clarity), and 4) Managerial Policies and Practices (Strategic Goal Setting, Resource Acquisition and Utilization, Creating a Performance Environment, Communication Processes, Leadership and Decision Making, Organizational Adaptation and Innovation). Kaufman and Zahn (1993) discuss the application of the input factors that affect the quality management in the school, such as the objectives, rules and regulations, budget, equipment, materials, faculty, students, learning resources, and community. Chandawanich (2004) describes the concept of a quality school as arising from the need to improve the quality of education as a system with the aim to bring equality of educational services to children in Thailand. Therefore, analyzing the quality of a school is associated with various components or contexts of the school which are the input factors: 1) good external environment of the school conducive for quality education, 2) sufficient number of teachers, administrators and education professionals, 3) physical characteristics of school standards, 4) courses appropriate to the learners and local community, 5) advanced media/technology, equipment, 6) various learning resources in the school, and 7) result-oriented budget.

Development system as transformational tool

Chaleo (2002) states that system is a "working unit" composed of a number of subsystem units. This means when the system is analyzed to identify a component, it is found to consist of a number of small units or subsystems with input, process, and product. Being a subsystem unit of a supra system unit means the system is part of the meta-system, the units of which are larger than this unit. Such a meta-system is composed of subunits or subsystems where a member or all of these components will work together to produce the results in a total yield of the meta-system. The development of the total quality management system for basic education under the Basic Education Commission is the research and development process which the researcher benefited from the system development process in these three steps: 1) System Investigation and Analysis, 2) System Design and Verification, 3) System Implementation and Evaluation, according to Edwards (1985), Stair (1996), Avison et al. (2003) and O'Brien et al. (2008).

THEORETICAL FRAMEWORK

Conceptual framework for Total Quality Management of Deming's PDCA or Deming Cycle: Plan - Do - Check - Act was applied in the design of a quality management system in the selected primary schools. It was used as an
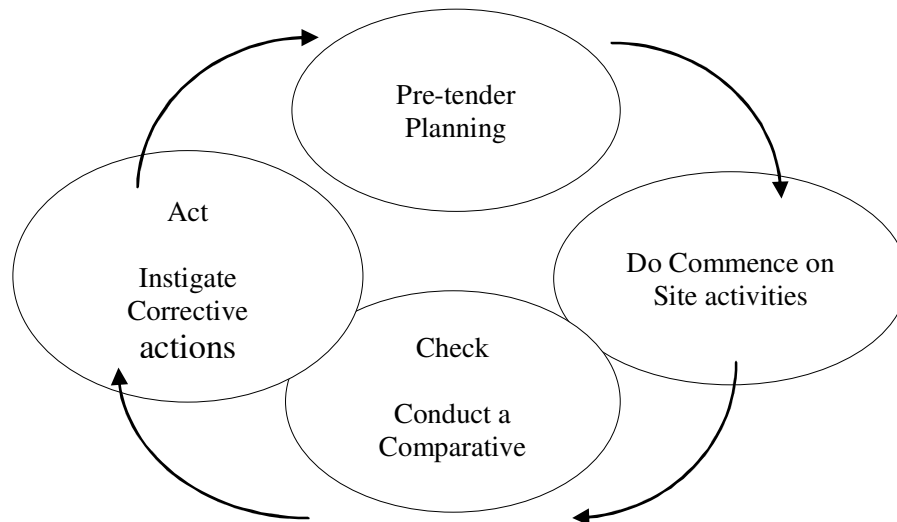
Figure 1. Deming Dynamic Control Loop Cycle.

open system in society consisting of four important elements: 1) Input, 2) Process, 3) Output and 4) Feedback. There are important characteristics of an open system with the management and control system that control the structure and design of subsystems in the organization. This leads to effectiveness and efficiency in achieving the goal of learners' quality. A school system is a system with workflows and continuous quality following PDCA or Deming Cycle as shown in Figure 1.

1. Plan: Identify students' and stakeholders' needs and expectations, set strategic objectives
2. Do: Implement and operate processes
3. Check: Collect the quality of students, monitor and measure the processes, review and analyze
4. Act: Continually improve process performance.

Mulcolm Baldrige National Quality Award: MBNQA,

There are seven categories that make up the Baldrige criteria. These criteria are the basis for choosing the award recipients and were designed to enhance competitiveness. More importantly, these criteria provide a framework which an organization can use to improve overall performance. The criteria are given in Table 1.

The researchers have applied this conceptual framework for developing a quality management system in the target primary schools under Department of Basic Education by synthesizing the following seven

components of the Total Quality Management:

1) Organizational Leadership: Vision, communication, policy, good governance
2) Strategic Planning: Strategy and gold, action plan
3) Students' and Stakeholders' Focus: Students' and stakeholders' needs and expectations, involved stakeholders
4) Knowledge Management, Analysis and Measurement: Monitor and measure the processes, review and analyze
5) Staff Focus: Human recourse, teamwork
6) Process Management: System and procedure, continuous improvement
7) Output and Outcome: Student result, student quality, academic achievement, key competencies and scores on achievement tests in reading, critical thinking and writing

Objectives of research

The objectives of this research were: 1) to study the components of a total quality management system in primary schools under Office of the Basic Education Commission, 2) to study the current situations and problems, and offer suggestions to improve the total quality management system in primary schools under Office of the Basic Education Commission, 3) to develop and implement a total quality management system in primary schools under Office of the Basic Education, 4) to study the effects or results of the total quality

Table 1. The 1992 Baldrige award criteria (1000 points total).

Leadership (90 points)	Management of process quality (140 points)
Senior executive	Design and introduction of products and services
Management for quality	Process management-production and delivery
Public responsibility	Process management-business and support
	Supplier quality
Information and analysis (80 points)	*Quality and operational results* (180 points)
Scope and management of quality and	Product and service quality
Performance data	Company operations
	Business process and support services
Competitive comparisons and benchmarks	Supplier quality
Strategic quality planning (60 points)	*Customer focus and satisfaction* (300 points)
Strategic quality and planning process	Customer relationships
Quality and performance plans	Commitment to customers
Human resource development and management (150 points)	
Human resource management	Customer satisfaction results
Employee involvement	Customer satisfaction comparisons
Employee education and training	Future requirements and expectations
Employee well-being and morale	

Source: George (1992).

management system implemented in primary schools under Office of the Basic Education Commission.

METHODOLOGY AND DATA ANALYSIS

Techniques of Research and Development (R&D) were employed for this study by using mixed methods research techniques by collecting data through quantitative as well as qualitative technique. This study investigated the development of an effective TQM to be employed in primary schools in Thailand. The research proceeded in three phases as shown in Table 2.

Phase 1: Systems Investigation and Analysis: This is the study and analysis of the total quality management system in primary schools under Office of the Basic Education Commission, current situation, and offers suggestions, consisting of the following steps:

Step 1: Study of concepts and theories from various documents and research in different countries, synthesize important elements to develop a total quality management system
Step 2: Monitoring and evaluation of the components of the total quality management system in key pilot schools by 5 experts.
Step 3: Surveying of the current situation, problems and suggestions regarding the implementation of a total quality management system in primary schools from the samples of 936 school administrators, academic staff, and teachers who were respondents by using a questionnaire scored according to a 5 Level Likert Scale. Data were analyzed by calculating the Mean and Standard Deviation

Phase 2: System Design and Verification. The aim of this phase

was to design and monitor the total quality management system in the primary schools under the Basic Education Commission, with the following detailed steps:

Step 1: Studying of the best practices in 3 primary schools (small, medium, and large) under Office of the Basic Education that have been granted a Royal Recognition Award during academic year 2011. The focus was to examine how some of the concepts, systems theory, administrative principles and guidelines for the management of schools can be fused with teaching excellence to improve student performance within the development of the total quality management system.
Step 2: Systems Design. This is the process of fusing different elements or components of the total quality management system in primary schools under Office of the Basic Education. The researcher used the results of the analysis and synthesis of papers and related research, taking into account the components of total quality management system, current problems, suggestions, and samples of the best practices in 3 primary schools (small, medium, and large) that received the Royal Recognition Award from Ministry of Education as the guidelines for designing and developing the total quality management system and preparing the manual of the total quality management system in primary schools under the Office of the Basic Education.
Step 3: System Verification. This step is to propose the developed design of the total quality management system in primary schools under Office of the Basic Education to 9 experts for examination and verification. The design will then be improved based on the comments and recommendations of those experts.

Phase 3: System Implementation and Evaluation. This step implements and evaluates the total quality management system in the selected primary schools under Office of the Basic Education

Table 2. phases of study.

Phase	Step	Person/Sample	Procedures/ collecting data	Result/outcome
1. Systems Investigation and Analysis	1. Study of concepts and theories from various documents and research	Researcher	Study and analysis data	Conceptual framework
1.1 Study the components of TOM,	2. Monitoring and evaluation of the components	key pilot schools by 5 experts.	the semi-structured interview	Components of TOM,
1.2 Survey of the current situation, problems and suggestions	3. Survey of the current situation, problems and suggestions	936 school administrators , academic staff, and teachers	the questionnaires 5 Level Likert Scale	Current situation, problems and suggestions TQM System in primary school
2. System Design and Verification	4. Study of the best practices in 3 primary schools (small, medium, and large)	School member administrators , academic staff, and teachers	Observations, interviews, the field notes record and audit trail,	Total Quality Management System in Primary schools
	5. Draft model of TQM. System 6. System Verification	9 experts for examination and verification	The system draft evaluation form	The manual for usage
3. System Implementation and Evaluation.	7. Implementation in 2 primary schools	Participant using system were 25 administrators, teachers and school members	The satisfaction level form, Documentary analysis,	Level of satisfaction
	8. Study of the effects of TQM System		O-NET examination report, and analyzing data by comparing to previous years	Score of academic achieve

after the system has been tried out, with these detailed steps:

Step 1: Application of the developed system in 2 primary schools under Office of the Basic Education, one is small with fewer than 120 students and the other is medium-sized with 120 – 300 students.

Step 2: Studying of the effects of the total quality management system piloted with the primary schools under Office of the Basic Education Commission.

Research instruments

Two types of research instruments were used: the instrument for work development and the instruments for data collection. They included the following: the semi-structured interview; the questionnaires; the field note record; the system draft evaluation form and the satisfaction level form, documentary analysis, and O-NET examination report.

RESULTS

Data consisted of semi-structured interviews. The results found that 5 experts mostly were in agreement about the components of a total quality management system in primary schools under the Office of Basic Education Commission found that inputs consist of 1) organizational leadership and 2) organizational resources, processes consist of 1) strategic planning 2) student and stake-holders focus 3) knowledge management analysis and measurement 4) staff focus and 5) process management.

Outputs consist of 1) learning achievement 2) core competency and 3) desired behaviors according to National basic curriculum and 4) student reading ability critical thinking and writing ability, as shown in Table 3.

Table 3. The results of agreement about the components of a total quality management system by 5 experts.

Data	Components of a total quality management system	Agreement	Percentage
Semi-structured interview	1. Input Factor	5	100%
	1.1 Organization leadership	5	100%
	1.2 Organization resources	5	100%
	2. Process Factor	5	100%
	2.1 Strategic planning	5	100%
Semi-structured interview	2.2 Focus on students and stakeholders	5	100%
	2.3 Knowledge management measurement , analysis,	5	100%
	2.4 Staff focus	5	100%
	2.5 Management process	5	100%
	3. Output Factor	5	100%
	3.1 Academic achievement	5	100%
Semi-structured interview	3.2 Key competencies	5	100%
	3.3 Desirable characteristics of basic education in 2008	5	100%
	3.4 The ability to read, think critically and writing of students	5	100%

Table 4. The results of current situations and problems to improve the total quality management system in primary schools.

Components of a total quality management system	Current situations			Problems		
	$\overline{X}$	S.D	Level	$\overline{X}$	S.D	Level
1. Input Factor	3.92	0.66	More	2.15	0.68	Less
1.1 Organization leadership	3.98	0.65	More	2.21	0.67	Less
1.2 Organization resources	3.86	0.68	More	2.09	0.69	Less
2. Process Factor	3.90	0.66	More	2.13	0.72	Less
2.1 Strategic planning subsystems	3.69	0.67	More	2.13	0.77	Less
2.2 Focus on students and stakeholders subsystems	3.63	0.76	More	2.08	0.70	Less
2.3 Knowledge management measurement , analysis, subsystems	4.08	0.70	More	2.17	0.75	Less
2.4 Staff focus subsystems	3.86	0.63	More	2.16	0.70	Less
2.5 Management process subsystems	4.26	0.57	More	2.13	0.69	Less
3. Output Factor	4.46	0.55	More	2.30	0.74	Less
3.1 Academic achievement	4.28	0.58	More	2.52	0.72	Moderate
3.2 Key competencies	4.49	0.55	More	2.23	0.61	Less
3.3 Desirable characteristics of basic education in 2008	4.42	0.61	More	2.13	0.78	Less
3.4 The ability of students to read, think critically and write	4.68	0.46	Most	2.35	0.85	Less
Overall	4.07	0.62	More	2.20	0.71	Less

The current conditions of Total Quality Management System in Primary Schools under the Office of Basic Education Commission and each dimension were in level of "more" ($\overline{X}$ = 4.07) and total problems and each dimension were in level of "less". ($\overline{X}$ =2.20) as shown in Table 4.

According to this study, a total quality management system for primary schools focusing on the customer

Input	Process	Output
●**Organizational Leadership** -Vision **-**Communication **-**Quality Police -Good Governance ●**Organizational Resources** -School resources include students, teachers and personnel, media and technology, buildings, learning resources, curricula suitable for students and community, and result-oriented budget -Outside resources include community support such as budget, learning resources, etc	● Process Management Subsystem ● Strategic Planning Subsystem ●Student and Stakeholder Focus Subsystem ● Process Management Subsystem ● Staff Focus Subsystem ● Knowledge Management Analysis and Measurement Subsystem	●Academic achievements in all levels of the school increased as compared to previous years ●Results of reading, critical thinking, and writing increased as compared to previous years ●Key capabilities of students attending Core Curricula of Basic Education 2008 increased as compared to previous years ●Desirable characteristics of students attending Core Curricula of Basic Education 2008 increased as compared to previous years

Feed Back

Environments Government Policies, Community, Culture, and Politics and Administration

Figure 2. Total Quality Management System in primary schools under Office of the Basic Education Commission.

orientation, total involvement, and continuous improvement applying TQM principles and synthesizing them by case study of the best practices in 3 primary schools (small, medium, and large). The results show that inputs consist of,

1) organizational leadership and 2) organizational resources, processes consist of 5 subsystems. There were Strategic planning subsystem, Student and stakeholder focus subsystem, Knowledge Management Analysis and Measurement subsystem, Staff Focus subsystem, and Process Management subsystem, that change the materials, and need inputs, organizational leadership and organizational resources leading to outputs such as learning achievement, core competency and desired characteristics based on National Curriculum, student reading ability and critical thinking and writing

(Figure 2).

The results of using developed system showed that in the small size primary school and medium size primary school, students presented their learning achievement, core competency and desired characteristics based on National Curriculum, student reading ability and critical thinking and writing increasingly and administrators, teachers and school members satisfaction in using totally and each dimension were in level of "more".

The results of the total quality management system implemented in primary schools showed that in small and medium sized primary schools, students had higher academic achievement, key competencies, desirable characteristics in line with the Basic Education Curricula of 2008, with better ability to read, think critically, and write accurately, and the satisfaction in bringing the system for use in small and medium-sized primary

schools as a whole and in each aspect was at a "more" level. Operation of the developed total quality management system in primary schools, small and medium, under Office of the Basic Education showed the following results:

Students' performance:

1. The average academic achievement in eight subject groups in the class and school was 80% or at a "high" level, which was increased, as compared to previous years.
2. Evaluation results of the key competencies based on the curriculum in five areas, that is, the ability to communicate, to think, to solve problems, to apply life skills, to use technology for learning in each group met the criteria set by the school or educational zone was at a "high" level or 80%, increased as compared to previous years.
3. Assessment of reading, thinking critically, and writing by students showed significant increase in performance at a "high" level or 80% up, as compared to previous years.
4. Evaluation results of the desirable characteristics: students demonstrated eight major desirable characteristics according to the Core Curriculum for Basic Education Act 2008: 1) Patriotism, Religiousness, and Loyalty to the Monarch, 2) Honesty and Integrity, 3) Discipline, 4) Inquisitiveness and Curiosity, 5) Self-sufficiency, 6) Hard-working Attitude, 7) Maintenance of Thai Identity, and 8) Public Mind. All of these were at 80% or higher, which was an increase as compared to previous years.

DISCUSSION

According to the research findings, there are interesting issues to be discussed as follows (Table 3).

According to Table 4, the finding of conditions of the total quality management system in primary schools under the office of Basic Education Commission indicated that the overall performance was found at a "more" level, ($\overline{X}$ = 4.07) and problems in implementing the total quality management system in primary schools under the Office of Basic Education Commission was found in the overall at a "less" level ($\overline{X}$ = 2.20). These results may have resulted from Thailand's policy of educational reform, National Education Act 1999 and its Amendment (No. 2) 2002 aimed to raise the standards and quality of education for all, with Section 47 specifying the need for quality assurance with internal quality assurance and external quality assurance systems, where the system for

internal quality assurance focuses on the decentralization of power to the learning institutions providing basic education under Section 48 (2). These allow the learning institutions and schools with jurisdiction over education to have a system of quality assurance in education to reassure stakeholders that all students receive a quality education from schools in order to develop competent and desirable educational standards prescribed in the basic education curricula. So, school is an important agency that must adopt the policy of education reform in the second decade (2009 to 2018) and put into practice to achieve the goals set forth in the strategic education reform in the second decade. It is necessary to improve the system to achieve educational quality by building a quality culture in schools, thus resulting in a change of management system. In addition to meeting the policy of educational reform, all learning institutions and schools must respond to Thailand's preparation to join ASEAN Community. As a result, all learning institutions and schools need to improve the total quality management process in schools more effectively.

The study showed that school systems in primary schools under the office of Basic Education Commission there were eight elements of the system: Two factors under Input 1) Organizational Leadership, 2) Organizational resources; five aspects of Process: 1) Strategic Planning Subsystem, 2) Students and Stakeholders Subsystem, 3) Knowledge Management, Analysis and Measurement, 4) Staff Focus Subsystem, 5) Process Subsystem; and one key Output, namely academic achievement, which includes key competencies desirable characteristics based on the Basic Education Curricula of 2008, and demonstrable abilities to read, think critically and write. Results from the study indicated that elements of the system behaved that way because the school is an open social system heavily influenced by the environment. The system relies on the relationship with people, organizations or other entities in such an exchange of mutual benefits and benefits that occur are well balanced. An open system is a living system, with holistic components of the system displaying the quality or holistic features that cannot be minimized or reduced to parts or components. Each system is nested in a hierarchy from a large system into subsystems.

The Input Factor: 1) Organizational Leadership: Administrators must have high academic leadership and vision in leading the organization, with a clear policy of focusing on improving the performance of the learners using participatory processes to keep pace with future changes, using ICT systems in teaching and administration, as well as the principles of good governance in the management, using communication skills well with

those who are concerned in planning, monitoring, controlling, and are driven to achieve the policy goals,

Organizational Resources: The resources of the school for proper administration are an important input in the working process of the system. Schools are required to supply a sufficient amount of resources to enable a subsystem of the system to work effectively. The resources can be divided into two types as follows:

Internal Resources: These are the resources within the school covering: 1) school personnel including a sufficient number of teachers who teach and perform their duties properly, and staff who serve as teaching support team, such as a secretarial teacher, 2) teaching materials including technology media, quality materials, advanced equipment, buildings, the environment within the school conducive to learning, such as learning resources laboratories, libraries that can be used in teaching activities and effective administration, 3) management including organizational management, clear structure of management covering 4 major tasks, namely academic workload, general affairs, personnel, and budget planning, and 4) budget, including the budget adequate for the plans and objectives.

External Resources: These are the resources outside school that affect working processes in the school, including various subsystems to get the cooperation and support of the community in areas such as budget and resources for education, economic, political and technological factors of the community, such as occupations and income, local political groups, technological applications for careers. These constitute the substantive content of the total quality management system in the primary schools under Office of the Basic Education Plan, as shown in Figure 2.

The details explain the functions of each subsystem.

1) Strategic Planning Subsystems: There is a workflow process in the organization through leadership where executives have to define the vision, mission, and goals of improving the performance of the learners. There are also a strategic planning process and an annual operating plan, with the involvement of stakeholders, including teachers, students, school board, parents, community monitoring, reviewing, and adjusting strategies of the school, including communications of the policy and ideas to teachers and concerned parties. Factors that need to run on the system are leadership and organizational resources toward productivity of subsystems. Strategic planning is a strategic plan and school action plans focusing on the performance of learners, the involvement

of stakeholders, and a better understanding of the operational order to reach the desired target, that is, student achievement. The feedback of the system is the result of the effects on the achievements of students in order to analyze the functional subsystems for the next strategic planning.

2) Student and Stakeholder Focus Subsystem: This consists of the work flow process, information management system that involves all stakeholders, communication process that listens to the opinions of students, parents, and community, public relations process that creates knowledge and understanding of the work of the school, process of continuously improving the quality of processes of teaching and learning. All these subsystems will depend on the organizational leadership and resources contributing to the desired output of the subsystem focusing on students and stakeholders: required data on students and stakeholders applied to improve the quality of work, information on the needs, satisfaction and dissatisfaction in order to improve the teaching process, knowledge and understanding of teachers and stakeholders, policy and direction of the school, the yield of the system including improved student performance, such as standardized achievement tests and key competencies and desirable characteristics based on the criteria stated in the Basic Education Curricula of 2008, and the measurable ability to read, think critically, and write, with feedback of the system relating to the quality of teaching and services rendered to students and stakeholders in order to improve the subsystems focusing on students and stakeholders.

3) Knowledge Management, Analysis and Measurement Subsystem: This comprises a workflow process, knowledge management and information technology management, grading operations of the organization as compared to the target set, analysis, review and improvement of the operations to further improve the quality of instructional process on a continuous basis. This will depend on several factors, such as organizational leadership and resources to reach the desired output of the subsystem for knowledge management, analysis and performance evaluation activities that include knowledge storage systems that contribute to improved performance, gathering the knowledge of how to use best practices in their work, the past performance when compared to the goals set to improve work processes, feedback or information that reflects back to improving student performance, achievements, desirable characteristics, and increased measures of key competencies of learners, including abilities to read, to think, critically, and to write, with feedback of the system which includes results of the development of knowledge management in the school and student performance as

compared to the targets set in the school strategies, and the results of performance measurement to improve the achievements of students in the past academic year and improve the work processes, knowledge management, analysis and performance of the organization.

4) Staff Focus Subsystem: This consists of a workflow process, planning, human resources, teamwork, performance evaluations and subsequent consequences for students, and creation of motivation and commitment to the organization among staff in the school. These will lead to desired outputs of the subsystem that focuses on staff, such as teacher development based on school strategies where teachers are developed to their full potential to meet the needs and fit the system of the school as it responds to school strategies, teachers' teamwork and team development, results of performance measurement, information technology for the development of teachers, teachers' satisfaction and commitment in organizations, improved working environment leading to the continuous development and progress of students, depending on the operational factors of organizational leadership and resources, and feedback of the system, including the quality of instruction and the commitment of personnel to improve the staff focus subsystem.

5) Process Management Subsystem: This includes a workflow process, system analysis, and a school system design which covers all four missions, namely teaching, student care, student activities, and support system-information technology. Process Management also includes evaluation, ongoing supervision, monitoring, reporting, communication and publicizing the workload to the relevant parties. This should lead to the desired output of the subsystem, namely, workload and job descriptions which are, appropriate for the management of primary schools focusing on the main systems of teaching, student care, student activities, and personnel management. Staff should be prepared with the knowledge and understanding of the burden of responsibility, operations manual, performance calendar, reduction of duplicated effort; teachers should understand and work towards the goal of student achievement.

Conclusion

The results of this study indicated that; the school administrator must have high academic leadership and the ability to develop quality in school, be able to manage environment and resources, both within and outside the school, to meet the quality of the students, be able to design strategic plans and annual operating plan, adhering to the principle of stakeholder involvement, with

the important goal of improving the achievements of students, process management to improve the quality continuously, development of schools as a learning organization, personnel teamwork, key processes of school administration covering four missions: academic, personnel, general administration, budget planning. These are the main functions of a school administrator whereas the teaching-learning process is the main function of the teachers.

School Administration System: It is the main duty of the executives to manage the organizational structure of the school administration consisting of Academic Affairs, Personnel, General Affairs, Budget Planning, using the PDCA cycle in the management of the subsystems at every step.

Monitoring and Reviewing of Performance Quality. This is to show the feedback at every stage, with effective internal quality assurance system. Internal Supervision: This is to monitor and follow up on the implementation of the project or plan to ensure the desired results of the students.

Participatory Work Process: This is to create networks of involvement by community agencies, both public and private, providing opportunities to listen to the opinions of students, parents, and community, based on Home-Temple-School trinity of cooperation to receive information from the lower levels to the upper levels.

Teaching: is the main function and importance of teachers in the school system. Teachers need to be prepared to teach, plan the lesson for knowledge management, consistent with the learning differences that exist between individuals. Therefore, the student supervising system should be a priority in the school system in order to help students thoroughly focus on the lessons.

Support Process: This includes the information technology system. The school should have information on school environment, inputs as the resources for school administration, both internal and external, that affect all the subsystems in the school useful in the strategic planning of the school. If the school has these conducive and beneficial factors, it will greatly benefit the work of the school system.

RECOMMENDATIONS

Applications

Applications should be done in the first semester of an academic year following the strategic planning and action

plan of the school. Leadership is needed focusing on the total quality management, good role model in creating corporate success value for achievements and results, vision, and actual use of existing database. The Office of the Educational Zone can apply the results of this study and use the developed system to train the staffs in creating an awareness of instructional quality and quality management leading to global standards.

Recommendations for future research

Subsystems should be studied in details as to what, why and how. Total Quality Management at other institutions should be studied using action research process to obtain an appropriate model for the school or learning institution. In-depth study of methods of collecting qualitative data for best practices should be conducted to understand how things work for best practices in terms of excellence in quality.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Music teachers' computer anxiety and self-efficacy

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This study aims to examine the computer anxiety and self-efficacy of music teachers in terms of different variables. The research is implemented on 124 music teachers. A personal information form and scales of Computer Anxiety and Self Efficacy are implemented on 124 music teachers. Data are analyzed with one way analysis of variance (ANOVA) and Pearson correlation coefficient. The results of the research show that gender creates a significant discrepancy in the perception of both computer anxiety (the computer anxiety of female teachers is higher) and self-efficacy (computer self-efficacy of male teachers is higher). The variables of occupational seniority, computer use frequency and having a computer of own do not create a significant difference for computer anxiety and its sub-factors "anxiety of harming the computer and the job", "learning anxiety" and computer self efficiacy. In addition, the variable of computer anxiety has been shown to make a significant difference for computer self-efficacy with computer anxiety and its sub-factors. In addition, it is seen that the music teachers who have their own computers, who use computers frequently and who have more experience in using computers have less computer anxiety and higher self-efficacy. Another finding of the study indicates that there is a high level of negative significant relationship between computer self-efficacy and computer anxiety. This reveals that those who have higher computer self-efficacy have less computer anxiety.

Key words: Music teacher, computer anxiety, computer self-efficacy.

INTRODUCTION

In the education and training process, utilizing information and communication technologies have caused significant innovations in education and also in many other fields. Undoubtedly, one of these fields is music and music education (Robyler and Edwards, 2000). Recent developments in music technology provide new opportunities for teachers and student in the musical field. Computer-aided music education contributes to more permanent and effective learning by increasing the motivation of students thanks to its auditory and visual content (Wai-chung, 2004; Rudolph et al., 2005). In the light of this

approach, it can be expected that using technology in music lessons will develop the students' knowledge and skills of singing and playing, and making them enjoy music lessons with entertaining games. For this reason, using information and communication technologies in education and training process is important. Using computers, software and internet technologies which have an important place for students' education should be one of the significant aims of an efficient music teacher. Using software programs in music lessons provide students with important contributions with new

methods in individual and group studies, while they also help them to develop their skills of composing and creativity (Robyler and Edwards, 2000).

The dissemination and implementation of educational innovations depend mainly upon teachers' adopting these innovations (Beckers and Schmidt, 2003). Studies have revealed that teachers cannot use technology in the education process to increase learning and that they do not feel ready (Haydn and Barton, 2007). However, computer is one of the developing technologies and it is important to use computers both in daily life and in educational environments as a teaching aid (Durkin et al., 2010). This enables many people to gain experience directly or indirectly about computer usage. In addition, researches revealed that teachers develop their own ideas and judgments about using technology in class and these facts affect the educational practice (Miller and Olson, 1999). Thus, it is emphasized that people who make great efforts and who are attentive to and allocate time for using computer technology in the education process have more self-esteem and self-efficacy (Rugayah et al., 2004).

Undoubtedly, it is possible to use computers effectively in the education and training process if there are teachers who are well-trained on using information technologies (Christanse, 2002; Özden et al., 2004). It is important for the teacher to utilize technology in classroom to make the students learn the subjects more profoundly and permanently (Wilson and Lowry, 2000). At this point, it is crucial to analyze the teachers' computer anxiety levels and self-efficacy beliefs. Upon analyzing the literature, it is seen that teachers' anxiety levels decrease as their computer self-efficacy increase and they tend to use technology more in their classes (Niederhauser and Perkmen, 2010; Anderson et al., 2011; Liu, 2011). Within this context, teachers' computer anxiety levels and self-efficacies are two different variances that should be considered to enable them to use computer and education technologies more efficiently and effectively in their education and training activities.

Computer anxiety is defined as a preconceived opinion and fear that arises when using computer technology (Chua et al., 1999); and as a feeling of tension and anxiety that is hard to understand towards using computers (Sam et al., 2005; Beckers et al., 2007). Researches in literature emphasize that computer anxiety is a situation-specific and momentary (state) anxiety that can be shaped (Barbeite and Weiss, 2004); and indicate that computer anxiety exists and is measurable (Saadé and Kira, 2007). The results of the literature study revealed that computer efficacy, which is the psychological sub-dimension of computer anxiety, affects the utilization of information technology and that there is a reverse relation between computer anxiety and computer

self-efficacy (Chua et al., 1999; Namlu and Ceyhan, 2002).

Efficacy is a social-psychological behavior that emphasizes the belief about the individual's ability to be effective on his/her own behavior, thoughts and motivations (Schriver and Czerniak, 1999). The basis of teacher efficacy concept is based upon Bandura's self-efficacy theory, while Bandura and Rotter are people who influenced the field of teacher efficacy (Rotter, 1966). According to Bandura, self-efficacy "is people's judgments about their capacities to perform and organize the actions required for a certain performance (Bandura, 1997, p.3).

Bandura's theory of self-efficacy is important in terms of revealing the levels of teachers' beliefs in their competence (Yılmaz et al., 2004). In this context, people with high levels of self-efficacies have confidence, are more ambitious in education and display better performance (Perkmen and Pamuk, 2011). When they encounter any challenge, they do not give up the struggle and preserve their patience (Dorman, 2001). In addition, it is determined that teachers whose self-efficacy is low tend to avoid challenges and do not seek new solutions to make the students learn more easily (Cappara et al., 2006). There are studies that indicate self-efficacy belief, which is an important field of study in raising teachers, increase people's strength and resistance to cope with challenges he/she might come across when performing a task, as well as increasing their motivation, assertiveness and success at work (Bandura, 1997; Goddard et al., 2000). These findings reveal the importance of computer self-efficacy belief and the importance of computers which will be an indispensable part of their professional life for teachers.

Bandura's theory of self-efficacy emphasizes the ability to control emotional state, fear, anxiety and stress. That is, the anxiety about a specific area (computer) and the self-efficacy about a specific area (computer) are the two sub-dimensions of computer self-efficacy within the framework of Bandura's theory of efficacy (Bandura, 1997). Computer self-efficacy concept came up by adapting the self-efficacy concept, which is a concept developed in the field of social psychology, to the area of computers (Lev, 1997). People's tendencies towards technology are closely related to their computer self-efficacy (Zhang and Espinoza, 1998). Within this context, computer self-efficacy is defined as an important structure that affects one's belief in his/her computer usage skills; and teachers' usage of computers in class-room (Albion, 1999). Studies of literature on computer self-efficacy determine that people whose computer self-efficacy belief is high are more eager when using computers, their anxieties about the computer is lower, they keep pace with the technological developments

more quickly, they trust themselves in challenges about computers, and they are more successful in resolving these issues (Doyle et al., 2005).

In addition, researches show that personality (Perkmen and Çevik, 2010); gender (Beckers and Schmidt, 2003; Ong and Lai, 2006; Beckers et al., 2007; Meelissen and Drent, 2008); computer experience (Niederhauser and Stoddart, 1994; Hasan, 2003; Galanouli et al., 2004; Çevik and Alkan, 2012); factors affecting computer usage (Leventoğlu, 2004; Teo, 2009; Nacakcı and Dalkıran, 2011); attitude towards computers (Roussos, 2007; Meelissen and Drent, 2008; Teo, 2008); computer anxiety (Woszczynski, 2001; Çakıroğlu et al., 2008; Uslu, 2008; Korobili et al., 2010) and computer self-efficacy (Aşkar and Umay, 2001; Hasan, 2003; Özçelik and Kurt, 2007; Çetin and Güngör, 2014) are important factors in the development of computer self-efficacy.

There are researches that reveal there is a significant relation between gender, computer anxiety and self-efficacy (Namlu and Ceylan, 2002; Doyle et al., 2005; Kay, 2008). For instance, Namlu and Ceylan's study on university students in Turkey (2002) suggested that computer anxiety was affected by variables such as gender, department and overall competence level of the class. Chua et al.'s conclusion of the study indicated that female students had higher computer anxiety compared to male students. They also found that there was an inverse correlation between computer usage experience and computer anxiety. A similar study conducted by Şeyhoğlu (2005) focused on 390 teachers and managers working in and around the Bergama province of Izmir and it was found that teachers and managers had low computer anxiety. In addition, no meaningful difference was found regarding the gender of the teachers study; however, there was a meaningful difference in favor of female managers in terms of computer anxiety. In addition, the positive and significant relation between computer self-efficacy and experience is supported by the results of various researches (Gong et al., 2004; Çelik and Bindak, 2005). Studies have shown that people who have more past experience about computers have higher computer self-efficacy than those who have less computer experience. Torkzadeh and Koufteros (1994) indicated in their studies that the belief of the individual in his/her computer self-efficacy increases significantly in line with the computer experience they gain.

When the studies conducted in the field of music are viewed it is observed that computer self-sufficiency increases in parallel with computer experience. For instance, a study that selected its participants from music teachers of Anatolion Fine Arts High Schools in different regions and from different socioeconomic background, found that these teachers found themselves competent in terms of recognizinig sound and computer technologies however, a few of the teachers considered themselves partially able (Sevinç and Koldemir, 2009). Çevik and Alkan (2012), in their study on pre-service music teachers, found that computer assisted learning was more effective and enjoyable and that it would increase the overall motivation of students thus prompting them to do more research as it provided a visual aspect to the class which may allow the topic to be understood better and also it would generate active participatipon of the indiviudal by ensuring their access to information. In this respect, it focuses on the necessity that pre-service music teachers should be trained in a way that would enable them to use technologies and allow them to have the experience.

Objectives and significance of the study

In today's world, rapidly changing and developing technology deemed it necessary and unavoidable for us to include computer use and its advantages in education as well as incorporating computers with classes for permanent and more effective teaching. So, teachers need to be able to use computers effectively and efficiently. This matter led researchers to give priority to certain aspects such as computer anxiety and self-sufficiency. Therefore, it is crucial to rationalize the teachers' beliefs and values on computer usage in education in order to change their it prejudices.

This study is important as it will reveal the music teachers' computer usage abilities. When the studies on this subject are examined it is clear that most studies concentrate on pre-service teachers. Literature search reveals the scarcity of research on this subject apart from the following citations: math (Çakıroğlu et al., 2008; Uslu, 2008) and computer (Özçelik and Kurt, 2007; Çetin and Güngör, 2014) teachers' computer anxiety levels and self-sufficiency. It has been examined that music education includes studies only about functionality and usability of computers and situations where computer assisted music education can be utilized (Levendoğlu, 2004; Sevinç and Koldemir, 2009; Nacakcı and Dalkıran, 2011; Çevik and Alkan, 2012). It has been highlighted that national literature has a very limited number of studies on computer anxiety and self-sufficiency and it has led to the idea that a study on this area might be beneficial. There is almost no more search which finds out computer anxiety and self-sufficiency of music teachers in our country and this made the conduct of the study necessary. This as the starting point makes this research important, as the study in question should be scrutinized for the determination of deficiencies in it and also to present solutions.

In this context, it should be considered that determining

whether music teachers feel self-sufficient while using computers is important as it is in every field in terms of reaching the technological standards of today and so that teaching methods are updated to ensure that computers can be used efficiently and effectively in classroom scenarios. Uncovering the factors that affect music teachers' computer anxiety and self-sufficiency is of the greatest importance in their using computers effectively and efficiently throughout their entire education and training. It is believed that this study will be a trail blazer for researchers that are planning studies in this or similar subjects. The aim of this study therefore is to detect how computer anxiety and self-sufficiency change based on the factors of gender, professional experience, computer usage frequency, computer experience and owning a computer in an attempt to understand the correlation between computer anxiety and self-sufficiency. This study sought answers to the following research questions:

1. Do the computer anxiety and self-efficacy of music teachers differ significantly according to the gender variable?
2. Do the computer anxiety and self-efficacy of music teachers differ significantly according to the professional seniority variable?
3. Do the computer anxiety and self-efficacy of music teachers differ significantly according to the computer usage frequency variable?
4. Do the computer anxiety and self-efficacy of music teachers differ significantly according to the computer experience variable?
5. Do the computer anxiety and self-efficacy of music teachers differ significantly according to the variable of having a computer?

METHOD

Participants

The study group of this research consists of 124 music teachers (76 females and 48 males) who work in various parts of Turkey and who are determined by easily accessible sampling method, which is one of the nonrandom sampling methods. The easily accessible case sampling method provides speed and practicality for the researcher because in this method, the researcher chooses a close and easily accessible case (Yıldırım and Şimşek, 2008). 42 teachers (%34) are from Marmara region, 40 (%32) teachers are from Aegean region, while 42 teachers (%34) participated in the study from other regions. The teaching experience of the participants varies between 1 year, 21 years and more.

Instruments

Personal Information Form, Computer Anxiety Scale and Computer Self-Efficacy Scale are used in this research to collect data.

Personal Information Form: A personal information form is composed in order to gain personal information from the teachers who attend the research. Personal information form constitutes of two sections. The first section on personal characteristics includes questions on gender and professional seniority regarding personal information; whereas the second section on computer experience includes questions on the computer usage frequency, computer experience, having a computer or not.

Computer Anxiety Scale (CAS): Developed by Ceyhan and Namlu (2000), this scale consists of 28 items and a structure of three factors. The first subscale is affective anxiety, second one is the anxiety of harming the computer and the job, and the third one is the anxiety of learning. The factor analysis shows that the scale explains 53% of the variance. The highest factor eigenvalue regarding the items obtained from the factor analysis of the scale is .76 whereas the lowest is .44. There are 13 items (Items 1-13) in the affective anxiety sub-dimension regarding computers, 9 items (Items 14-22) in the sub-dimension of anxiety of harming the computer and the job and 6 items (Items 23-28) in the sub-dimension of computer learning anxiety. For example, the item that states "I cannot feel comfortable at all when working with the computer" measures affective anxiety, the item that states "I feel nervous when using computer" measures the anxiety of harming the computer and the job, the item that states "The thought of making a mistake affects my working on the computer negatively" measures the anxiety of learning. The scale items that include positive statements are scored as "Always: 4, Frequently: 3, Sometimes: 2, Never: 1". There are 24 negative and 4 positive statements in the scale. The positive statements are calculated in reverse order. The total score gained from calculation the computer anxiety level of the students is divided into 28, which is the number of questions. Accordingly, every person in this study achieved computer anxiety scores varying from 1 to 4. Higher score means higher anxiety. The internal consistency coefficient for all items is .92. The α coefficients of CAS's sub-factors are as follows: affective anxiety sub-factor regarding computers (Items 1-13) is .92; the sub-factor of the anxiety of harming the computer and the job (Items 14-22) is .89; the sub-factor that measures computer learning anxiety (Items 23-28) is .73. Cronbach alpha value of computer anxiety scale is .90 in this study.

Computer Self-Efficacy Scale is developed by Aşkar and Umay (2001) and the reliability coefficient of the scale that consists of 18 items is .71. The answers are scored in accordance with the fivefold Likert scale. The positive items are scored as 5 points for "Always" and 1 point for "Never", while the scoring is reversed in negative items as 1 point for "Always" and 5 points for "Never". Some of the items in computer self-efficacy scale are "I feel sufficient on the computer", "I can solve problems about computers if I try enough", "I think I can use computer effectively". When the distinctiveness of the items in scale are calculated (the correlation of scale scores and the scores they get from the item) it is understood that the distinctiveness of most of the items is high (Average 0.50). This result means that the item validity of the scale is acceptable.

Data analysis

Independent samples t-test is used in comparisons over two variables whereas One-Way ANOVA (Single-Factor Variance Analysis) is used in Independent samples for more than two variables. If the F-test is significant as a result of variability analysis, Tukey-HSD test is used in order to determine the group this discrepancy results from. The significance level in the statistical

Table 1. Results of t-test regarding computer anxiety and self-efficacy in terms of gender

	Gender	N	$\overline{\mathbf{X}}$	SD	t-test	
					t	p
Computer anxiety	Female	76	3.85	.78	1.539	.01*
	Male	48	3.31	.58		
Affective anxiety	Female	76	2.48	.52	1.085	.48
	Male	48	2.40	.60		
Anxiety of harming the computer and the job	Female	76	3.01	.76	2.615	.12
	Male	48	3.88	.70		
Anxiety of learning	Female	76	2.70	.65	2.077	.04*
	Male	48	3.63	.71		
Computer self-efficacy	Female	76	2.54	.44	1.673	.03*
	Male	48	2.93	.70		

*p<.05.

analysis used in the study is .05. In addition, pearson correlation analysis is applied to determine the relation between computer anxiety and self-efficacy.

RESULTS AND FINDINGS

Findings on the variables about demographic characteristics

The findings on the variables of gender and professional seniority of music teachers' scores regarding computer anxiety, its subscales and computer self-efficacy are given in Table 1.

When computer anxiety was examined in terms of gender, it was found that computer anxiety among female music teachers ($\overline{\mathbf{X}}$=3.85) was higher than among male teachers ($\overline{\mathbf{X}}$=3.31) [t=1.539, *p<.05*], while the scores of male music teachers in "anxiety about learning the computer" ($\overline{\mathbf{X}}$=3.63) was higher than among the female teachers ($\overline{\mathbf{X}}$=2.70). Furthermore, it was also seen that the computer self-efficacy of female music teachers ($\overline{\mathbf{X}}$=2.54) was lower than that of male teachers ($\overline{\mathbf{X}}$=2.93) [t=1.673, *p<.05*].

As seen in Table 2, the analysis shows that computer anxiety, anxiety about harming the computer and the job and the learning anxiety of music teachers with 1-5 year professional seniority ($\overline{\mathbf{X}}$=2.33) is lower than in teachers whose seniority is 6-10 years ($\overline{\mathbf{X}}$=2.65), 11-15 years ($\overline{\mathbf{X}}$=3.22), 21 years and more ($\overline{\mathbf{X}}$=3.88). In contrast, the computer self-efficacy of music teachers whose professional seniority is 1-5 years ($\overline{\mathbf{X}}$=3.48) is higher

than of teachers with seniority of above 16-20 years ($\overline{\mathbf{X}}$=2.86) and 21 years and more ($\overline{\mathbf{X}}$=2.47).

Findings on variables regarding computer experience

Findings on the variables regarding computer usage frequency, computer experience, computer ownership of music teachers' scores on computer anxiety, its subscales and computer self-efficacy are given below.

As seen in Table 3, it was seen that computer usage frequency creates a statistically significant discrepancy in terms of computer anxiety, anxiety of harming the computer and the job, anxiety of learning and computer self-efficacy. However, it is seen that the level of affective anxiety does not create a statistically significant discrepancy. The teachers who use computers every day ($\overline{\mathbf{X}}$=2.63) have less computer anxiety than teachers who use computers once a week ($\overline{\mathbf{X}}$=3.98) and those who use computers several times a week ($\overline{\mathbf{X}}$=3.02). In contrast, the computer self-efficacy ($\overline{\mathbf{X}}$=3.50) of the music teachers who use computers "everyday" is significantly higher than music teachers who use computers several times a week ($\overline{\mathbf{X}}$=3.10) and once a week ($\overline{\mathbf{X}}$=2.61). On the other hand, the computer self-efficacy of music teachers who use computers several times a week is higher than those who use computers once a week.

When Table 4 is analyzed, computer experience reveals significant discrepancy for computer anxiety, affective anxiety, anxiety regarding harming the computer and the job, anxiety of learning and computer self-

Table 2. ANOVA results regarding computer anxiety and self-efficacy in terms of professional seniority.

	Variance resource	Sum of squares	Degree of freedom	Mean of Squares (S)	Significance value (F)	p	Significant difference
Computer Anxiety Total	Intergroup	7325.01	2	3662.50	9.406	.00*	1-5; 2-5; 3-5
	Intragroup	46720.82	120	389.34			
	Total	54045.83	122				
Affective anxiety	Intergroup	1020.83	2	510.41	3.315	.16	-
	Intragroup	18626.91	121	153.94			
	Total	19647.74	123				
Anxiety of harming the computer and the job	Intergroup	345.11	2	172.55	2.738	.03*	1-5; 2-5;3-5
	Intragroup	7563.13	120	63.02			
	Total	7908.24	122				
Anxiety of learning	Intergroup	34.52	2	17.26	2.006	.00*	1-5; 2-5; 3-5
	Intragroup	1041.23	121	8.60			
	Total	5248.75	123				
Computer self-efficacy	Intergroup	12.35	2	6.17	6.993	.00*	1-4; 1-5
	Intragroup	105.14	119	.88			
	Total	117.49	121				
	Total	117.49	121				

*$p<.0.5$ Professional seniority (1= 1-5 years; 2= 6-10 years; 3= 11-15 years; 4= 16-20 years; 5= 21 years and more).

Table 3. ANOVA results of computer anxiety and self-efficacy in terms of computer usage frequency.

	Variance resource	Sum of squares	Sd	Mean of squares	F	p	Significant difference
Computer Anxiety Total	Intergroup	5026.11	2	2513.05	4.111	.03*	1-2; 1-3; 2-3
	Intragroup	73354.20	120	611.28			
	Total	78380.31	122				
Affective Anxiety	Intergroup	27.45	2	13.72	.911	.18	-
	Intragroup	1822.45	121	15.06			
	Total	1849.9	123				
Anxiety of harming the computer and the job	Intergroup	158.43	2	79.21	1.385	.00*	1-2; 1-3; 2-3
	Intragroup	6860.51	120	57.17			
	Total	7018.94	122				
Anxiety of learning	Intergroup	25.31	2	12.65	1.484	.02*	1-2; 1-3; 2-3
	Intragroup	1031.04	121	8.52			
	Total	1056.35	123				
Computer self-efficacy	Intergroup	10.32	2	5.16	5.931	.00*	1-2; 1-3; 2-3
	Intragroup	103.56	119	.87			
	Total	113.88	121				

*$p<.0.5$ Computer usage frequency (1= Once a week; 2= Several times a week; 3= Every day).

efficacy. It is seen that computer anxiety ($\overline{X}$ =3.85), affective anxiety ($\overline{X}$ =2.99) and harming the computer and the job ($\overline{X}$ =2.10) among music teachers who say they are very experienced in using computers is lower

Table 4. ANOVA results of computer anxiety and self-efficacy in terms of computer experience.

	Variance resource	Sum of squares	Sd	Mean of squares	F	p	Significant difference
Computer Anxiety Total	Intergroup	5531.29	2	2765.64	4.575	.00*	1-2; 1-3; 2-3
	Intragroup	72530.31	120	604.41			
	Total	78061.6	122				
Affective Anxiety	Intergroup	32.58	2	16.29	.837	.01*	1-2; 1-3; 2-3
	Intragroup	2345.21	121	19.46			
	Total	2377.79	123				
Anxiety of harming the computer and the job	Intergroup	231.25	2	115.62	1.986	.00*	1-2; 1-3; 2-3
	Intragroup	6983.20	120	58.19			
	Total	7214.45	122				
Anxiety of learning	Intergroup	25.21	2	12.60	1.431	.02*	1-3
	Intragroup	1065.23	121	8.80			
	Total	1090.44	123				
Computer self-efficacy	Intergroup	12.36	2	6.18	6.652	.00*	1-2; 1-3; 2-3
	Intragroup	110.62	119	.92			
	Total	122.98	121				

*p<.05 Computer experience (1= No experience; 2= Little experience; 3= Very experienced).

than among those who say they have little experience and those who say they have no experience in using computers. Also, it was revealed that the computer self-efficacy scores of the music teachers who said they are very experienced in using computers ($\overline{X}$=3.75), was significantly higher than those who said they have no experience ($\overline{X}$=2.44) and those who said they have little experience ($\overline{X}$=3.21). The learning anxiety ($\overline{X}$=3.83) of the music teachers who said they are very experienced was significantly higher than those who have no experience ($\overline{X}$=2.48).

Computer anxiety among teachers who do not have their own computers ($\overline{x}$=4.15) is higher than among those who have their own computers ($\overline{X}$=3.96) [t=5.674, p<.05]. In addition, considering the anxiety of harming the computer and the job, it is seen that the score of those who do not have their own computers ($\overline{X}$=3.74) is higher than of those who have their own computers ($\overline{X}$=3.58). Considering "learning anxiety", it is seen that the score of those who do not have their own computers ($\overline{X}$=4.11) is higher than those who have their own computers ($\overline{X}$=4.09). Another result of the research reveals that the music teachers' computer self-efficacy statistically differs when considered in terms of computer ownership [t=4.643, p<.05]. In other words, the computer self-efficacy of those who have their own computers ($\overline{x}$=3.78) is higher than those who do not have their own compu-

ters ($\overline{X}$=3.43) [t=4.643, p<.05] (Table 5).

Findings on the relation between computer self-efficacy, computer anxiety

As seen in Table 6, it is seen that there is a high-level, negative and significant relation between computer self-efficacy and computer anxiety (r= -.77, p<.01). It is revealed that there is a high-level, negative and significant relation (r= -.65, p<.01) between computer self-efficacy and affective anxiety; a high-level, negative and significant relation (r= -.61, p<.01) between computer self-efficacy and the anxiety of harming the computer and the job; and a low-level, positive and significant relation (r= .18, p<.05) between computer self-efficacy and the anxiety of learning.

This study, which was conducted to reveal the computer anxiety and self-sufficiency of music teachers, reached the following conclusions:

1. Female music teachers have higher computer anxiety compared to their male counterparts.
2. The anxiety scores of male music teachers related to "learning to use the computer" were higher than those of the female teachers.
3. Female music teachers have lower computer self-sufficiency compared to male teachers.
4. Those who have between 1 to 5 years of seniority in their professions have less "computer anxiety," "anxiety in

Table 5. ANOVA results of computer anxiety and self-efficacy in terms of computer ownership.

	Ownership status	N	$\overline{\mathbf{X}}$	SD	t-test	
					t	p
Computer Anxiety	Yes	88	3.96	.49	5.674	.01*
	No	36	4.15	.54		
Affective Anxiety	Yes	88	3.50	.56	4.885	.48
	No	36	3.62	.59		
Anxiety of harming the computer and the job	Yes	88	3.58	.65	5.615	.02*
	No	36	3.74	.59		
Anxiety of learning	Yes	88	4.09	.52	4.977	.04*
	No	36	4.11	.54		
Computer self-efficacy	Yes	88	3.78	.62	4.643	.03*
	No	36	3.43	.65		

*p<.05.

Table 6. The relation between computer self-efficacy, computer anxiety.

	1	2	3	4	5
1. Computer Anxiety	-				
2. Affective Anxiety	.89**	-			
3. Anxiety of Harming the Computer and the Job	.84**	.71**	-		
4. Anxiety of Learning	.32**	.18*	.21**	-	
5. Computer Self-efficacy	-.77**	-.65**	-.61**	.18*	-
*p<.05; **p<.01					

learning," and "anxiety regarding harming the job they are working for" when compared to those who have between 6-10, 11-15, 21 or more years of seniority in their profession.

5. Music teachers who have a seniority of 1-5 years in their profession have higher computer self-sufficiency when compared to those with 16 to years of working experience or those with more than 21 years of experience.

6. Computer usage frequency does not form a meaningful correlation for computer anxiety, spoiling the work they are working for and computer self-sufficiency. Music teachers using computers every day have less anxiety than those who use computers once a week or a few times a week.

7. Music teachers using computers every day have higher self-sufficiency than those who use them once or a few times a week and those who use computers a few times a week have higher self –sufficiency than teachers using computers once a week.

8. The teacher who claims to have "a lot of computer experience" has lower computer anxiety, affective anxiety and a fear of harming the computer and the work they are doing compared to those who say they have little experience and those who state they have no experience.

9. The music teachers who claimed to have a lot of computer experience had higher computer self-sufficiency compared to those who stated that they had no experience and those who declared having little experience.

10. Music teachers who claimed to have a lot of computer experience had higher learning anxiety compared to those who had no computer experience.

11. Music teachers who did not have their own computers had more computer anxiety than those who had their own computer.

12. Music teachers who did not have their own computer had higher scores on items such as "harming the computer and work being studied on" and "learning anxiety" than teachers with their own computers.

13. Music teachers with their own computers had higher computer self-sufficiency than those who did not have a computer of their own.

14. There is a high negative and meaningful correlation between computer self-sufficiency and computer anxiety.
15. There is a high level of negative and meaningful correlation between the sub-level of computer anxiety, which are affective anxiety and computer anxiety.
16. There is a high-level, negative and significant relation between computer self-efficacy and the anxiety of harming the computer and the job.
17. It was found that there was a positive and meaningful low-level correlation between "computer self-sufficiency" and "learning anxiety."

DISCUSSION

In information age, there is a need for people who can access information quickly. Thus, it is possible to access any kind of information thanks to the rapid changes and developments in technology. In this context, the importance of computer in disseminating and sharing information is undeniable. The rapid changes and developments in science and technology provide new opportunities in education. With these opportunities, it is very important for the teachers to gain the ability of using these opportunities. Concordantly, this study aims to reveal the relation between computer anxiety and self-efficacy by analyzing the computer anxiety and self-efficacy of music teachers in terms of various variables.

According to the findings of the study, computer anxiety levels of female music teachers were higher than those of male music teachers. There are similar results in literature regarding this finding (Chua et al., 1999; Namlu and Ceyhan, 2002; Beckers and Schmitt, 2003). However, there are also studies that reveal there is no significant relation between computer anxiety and gender (North and Noyes, 2002; Sam et al., 2005; Tekinarslan, 2008). One of the reasons behind the results of the research is that not only men but also women cannot remain unresponsive to the rapidly changing and developing technology and their eagerness towards using computers increase with that. On the other hand, there are also researches that say the reason why the computer anxiety levels of women is higher than men is because of the gender roles determined by the society. These studies emphasize that women receive less support than men in being guided towards professions related with computers and in working with technological tools. This may be considered as another reason why women avoid technology more than men do (Namlu and Ceyhan, 2002; Deryakulu and Olkun, 2007). The research also reveals that male teachers score higher than women in the anxiety sub-dimension of computer anxiety scale and they are more anxious in learning how to use computers. Other studies also support this result

(Miura, 1987).

Another finding of the study was that the self-efficacy of female music teachers was seen to be lower than their male counterparts. This reason of this may be the fact that men are more interested and curious about technology starting from their childhood. Collis and Ollila (1990) indicate that computer usage is a rather male-specific activity starting from childhood. The study of Seybert (2007) emphasize that men use computers more, they have more computer skills and work in computer-related jobs more than women. There are similar results in literature regarding these findings (Durndell et al., 2000; Tekin, 2007; İpek and Acuner, 2011). However, many studies carried out within this context reveal that there is no significant discrepancy between computer self-efficacy and gender (Kuş, 2005; Sam et al., 2005; Pamuk, 2009; Balcı, 2013).

The computer anxiety levels of music teachers who attended the research show a statistically significant discrepancy in terms of professional seniority. There are studies in literature that support this finding (Çevik, 2006; Uslu, 2008). Şeyhoğlu (2005) examines teachers' computer anxiety according to their professional seniority. Delvecchio (1995) indicates that young people have the opportunity of interacting with computers more than their previous generation, and the young ones have less computer anxiety when compared to the elder. It is evident that the level of computer anxiety increases with the professional seniority. This makes us think that young teachers use computer in their daily lives more and can deal with the technology better as the importance of computer education increases in Teachers College that train teachers. Another result of the research reveals that there is a statistically significant discrepancy between music teachers' computer self-efficacy and the variable of professional seniority. It can be said that the beginner teachers have higher computer self-efficacy and less computer anxiety. This finding is parallel with the studies carried out in this field (Kuş, 2005; Özçelik, 2006). Rowand (2000) emphasizes in his research that the teachers whose experience is less than 9 years use the Internet more frequently to gain more information and share information with their colleagues than the teachers who have experience for 20 years and more. It is evident this result shows that the beginner teachers take computer lessons during their undergraduate study and have more opportunity to use computer, which is why they are more interested in computers and have better cognitive basis related with computers. In addition, the teachers who are at the beginning of their profession can be more efficient and effective in following up with the new technology, thanks to their knowledge and experience.

Here, it is seen that the frequency of computer usage

creates a statistically significant discrepancy for computer anxiety and its sub-dimensions which are the anxiety of harming the computer and the job, and also computer self-efficacy. This result shows that using computer everyday increases computer self-efficacy and reduces computer anxiety. In this context, teachers' beliefs, experiences and approaches affect computer usage in the education and training process (Andris, 1995). There are studies in literature that reveal the relation between computer anxiety and computer usage (Pope-Davis and Vispoel, 1993; Kay, 2008). In addition, several studies show that the frequency of computer usafe reduces computer anxiety and increases self-efficacy (Zhang and Espinoza, 1998; Aşkar and Umay, 2001; Wilfong, 2006; Korobili et al., 2010). These findings support the study. Brown (2008) indicates that there is a relation between computer usage and self-efficacy, and the perceptions of the individual have a determining role on computer skills. He also emphasized that the people who have high levels of computer self-efficacy are more determined in performing computer tasks and completing these tasks despite potential challenges. There are other studies that support this finding (Langford and Reeves, 1998). It is evident that most of the studies show that computer usage is effective in the learning process of the individual (Naevdal, 2007; Kubiatko and Vlckova, 2010). In a study conducted on music teacher candidates, it is reported that individuals may actively attain knowledge and gain experience through computer-aided music lessons (Çevik and Alkan, 2012).

It is seen that computer experience, which is another variable of the research, creates a statistically significant discrepancy for computer anxiety and its sub-dimensions which are affective anxiety, anxiety of harming the computer and the job, anxiety of learning and computer self-efficacy. This finding reveals that the music teachers who are very experienced in using computers have higher computer self-efficacy and less computer anxiety than the others. There are studies that emphasize computer experience has a positive effect on computer anxiety and self-efficacy (Chua et al., 1999; Wilfong, 2006; Korobili et al., 2010). These findings support the aforementioned studies and also show that the people who are very experienced in using computers and who use computer frequently have less computer anxiety and higher self-efficacy levels. The studies examine the variables such as computer usage time, computer usage frequency etc. under computer experience title. Thus, it is underlined that the computer experience increases and the anxiety decreases for the individual who use computer frequently (Chua et al., 1999, Wilfong, 2006).

There are also studies that reveal many teachers have very little experience in learning via computers in their own self-improvement (Niederhauser and Stoddart,

1994). Marcoulides and Wang (1990) show that there is a negative and significant relation between computer experience and computer anxiety. There are also studies in literature that reveal there is a positive relation between computer experience and computer self-efficacy (Chua et al., 1999; Milbrath and Kinzie, 2000). This can be because the individual is supported to use computer and also because he has former experience (course, lesson, etc.) before he starts teaching profession. It can be said that the people who have such experience may have higher self-efficacy perceptions regarding computer usage. A study emphasizes that experience is one of the factors that affect self-efficacy and there is a close relation between behaviors and experience, and also between experience and the development of self-efficacy (Akkoyunlu and Kurbanoğlu, 2003). Skills are developed as the experience increases, and the self-efficacy perception improves accordingly (Bandura, 1997). These results support the findings of this study.

Another finding of the research shows that there is a statistically significant discrepancy when the computer anxiety of music teachers is analyzed according to computer ownership. It can be said that the eagerness for using computers shall increase and computer anxiety levels shall drop if the teachers who do not have their own computers become more familiarized with computers for their lives. These findings are in parallel with other studies (Albion, 1999; Hong and Koh, 2002; Şeyhoğlu, 2005). There is a statistically significant discrepancy when the computer self-efficacy of music teachers is analyzed according to computer ownership. This finding supports other studies in literature (Özçelik; 2006; Topkaya, 2010; İpek and Acuner, 2011). If teachers have their own computers, they are expected to access the information they want anytime according to their computer usage frequencies. It can be said that they can feel more sufficient in using computers and their self-efficacy levels can increase as the frequency of using computers gets higher. On the other hand, a research shows that there is no significant relation between computer ownership and computer self-efficacy (Usluel and Seferoğlu, 2003).

Another important finding in the research reveals a high-level, negative and significant relationship between computer anxiety and computer self-efficacy. This finding supports the findings of other studies in literature (Wilfong, 2006). This result shows that the people who have lower computer self-efficacy levels experience more anxiety and those who have higher self-efficacy experience less anxiety. At this point, the computer usage frequency and computer experience increases computer self-efficacy and reduces the anxiety. In conclusion, this study offers a useful perspective to understand the computer anxiety and self-efficacy of

music teachers.

It would be useful for the following researches to analyze the music teachers' technology integration self-efficacy levels instead of computer self-efficacy. A teacher's high computer self-efficacy level does not guarantee that he/she will be able to efficiently integrate technology in class environment. Accordingly, it is essential to determine the self-efficacy of music teachers in technology integration (Wang et al., 2004; Niederhauser and Perkmen, 2008) and to analyze the relation between that and technology integration performance (Perkmen and Pamuk, 2011) and motivation (Perkmen, 2014).

Conflict of Interests

The author has not declared any conflict of interests.

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Full Length Research Paper

How to classify the diversity of seventh grade students' mathematical process skills: An application of latent profile analysis

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The researcher applied latent profile analysis to study the difference of the students' mathematical process skill. These skills are problem solving skills, reasoning skills, communication and presentation skills, connection knowledge skills, and creativity skills. Samples were 2,485 seventh-grade students obtained from Multi-stage Random Sampling. Each student was measured by the mathematical process skills test which consists of 44 items in total. The research results indicated that the students can be categorized into three groups: the high mathematical process skills students (2.74%), the moderate mathematical process skills students (40.48%), and the low mathematical process skills students (56.78%). Moreover, from the research results, it also shows that the creativity skills seem to be the problem in every group of students. The detail of the research findings has been discussed in this paper.

Key words: Latent profile analysis, mathematical process skills, problem solving skills, reasoning skills, communication and presentation skills, connection knowledge skills, creativity skills.

INTRODUCTION

Mathematical process skills are important capabilities for mathematics' learning (Norhatta and Tengku, 2011). In order to be good in mathematics, learners are required not only to memorize contents and to understand the mathematical problems. They also need to have mathematical process skills to help them learn. The skills can enhance students' ability to solve a problem correctly and logically, according to a given concepts. Students will be able to use the skills to communicate and present mathematical language more effectively (Takahashi, 2007; Giganti, 2004; Jonassen, 2004; Brown, 2003). Conversely, if students lack these skills, they will not able to apply mathematical process skills to solve problems under different circumstances or situations. They will lack the

connective knowledge that would further their ideas of creativity and other important skills for an advance mathematics (Moscardini, 2009; Ketterlin-Geller et al., 2008; Brown, 1994; Cawley and Parmar, 1992).

According to the theory, mathematical process skills are capabilities that are applied to mathematics for various situations. The mathematical process skills are contributed by these factors; 1) problem-solving skills 2) reasoning skills 3) communication and presentation skills 4) connection knowledge skills and 5) creativity skills (Thailand Ministry of Education, 2008; NCTM, 2000; Lyon, 2001; Alice and Shirley, 1994; Confrey, 2007; Sak and Maker, 2006). The results of mathematical process skills development given by previous studies indicate that, lacking these skills cause big problems not only in Thailand but also worldwide. Many studies found out that mathematics' issues are directly related to mathematical process skills from time to time (Brendefur et al., 2013; Jordan et al., 2009; Morgan et al., 2009; Duncan et al., 2007; Meissner, 2000; Lester, 1994). A great number of studies are aimed in developing mathematical process skills, but most of them have found that there were major problems in terms of applications of these skills realistically. This is due to the fact that the skills were very complicated while most of the previous studies were done by using composite score measurement (Ning and Sun, 2011; Ramdass, 2011). The students with high capability in mathematical process skills do not necessarily have high potential in all of the skills; meanwhile, for those students who have a low capability in mathematical process skills in some of the skills but not at all. Therefore, it is very difficult to indicate which skills are low or high, or should be improved. Moreover, Piaget's cognitive theory (1952) also explained that each of the skills was dependent on developmental age. Additionally, some of them influence the development of the other skills. Therefore, it can be concluded that mathematical process skills are not necessarily developed at the same time (Raghubar et al., 2010). In addition, the contents taught in schools do not allow students to improve these skills at the same time (Fisher, 1990; Brown et al., 1990). With these inconveniences, they cause problems in measurements strategies that it is impossible to indicate students' outstanding or poor skills of each student. Moreover, learners developed the skills with similar strategies without the consideration of individual differences; academic disability issues have caused long-term problems even though there is developed doubt of the continuous evolution of innovation.

Latent Profile Analysis (LPA) is a new statistical analysis method used to search and categorize members into a subgroup. Its outstanding advantages are 1) Able to identify group prominence causing obvious differences. 2) Able to apply to a group with unknown subgroup. 3) Identify probability to categorize members into a group by using maximum likelihood method. 4) Decreases measurement error. 5) Affects less of missing data and 6)

the complex structure variables increase tendency to categorize (Enders, 2010; Thompson, 2007; Schafer and Graham, 2002; Bray et al, 2006). LPA was developed by Lazarsfeld and Henry in 1968. It has been widely applied to many fields of studies including social science. This is because interested variables to be studied of each individual are different in both known groups, such as sex (Ganley and Vasilyeva, 2011; Patterson et al., 2003; Rodd and Bartholomew, 2006; Effandi and Normah, 2009) and school size (Lamb and Fullarton, 2000; Willms and Raudenbush, 1989; Fredriksson et al., 2013; Humlum and Smith, 2014), and unknown groups. The findings from this analysis method will help to indicate each group's characteristics and differences. Moreover, it gives more accurate information on the classification which will later give obvious information to fulfill the needs of each group.

As mentioned from the issues and theories, the researcher studied the different structures of mathematical process skills by applying the LPA. The researcher found that this method has high possibility to show differences of these skills individually which will later assist in determining the skills of each group of students correctly as well as in designing the most appropriate learning strategies for students difference groups. Moreover, it is an application of the most effective analysis method used for complex structure variables that were difficult to study.

Research objectives

1) To compare mathematical process skills of seventh-grade students classified by gender and school size.
2) To classify mathematical process skills of seventh-grade into groups by using LPA

Research hypothesis

The synthesis of theories and study of previous researches indicate that males in early ages show the highest level of development in comprehension. At this age, the male students are able to learn about abstract subjects and problem solving better than female (Piaget, 1952). Similar finding is in many studies on related subjects (Ernest, 1991; Rogers, 1995; Burton, 1995). The findings of these researches were confirmed by all of them. Therefore, the researcher developed the hypothesis; mathematical process skills of male students are different from those of females. Moreover, supportive classroom environment theory (Bloom et al., 1965; Dunn et al., 1989) and similar finding of the research result show that large schools in Thailand are able to access good study materials which enhance learning management easier compared to small and medium school size. Therefore, there is a doubt that school sizes are likely to

have different effects on mathematical process skills.

The revision of literature on the mathematical process skills showed that there were many indicators that created structure's complexity (Kilpatrick et al., 2001) and these indicators brought difficulty to classify the skills into group, include the study result in terms of heterogeneous population (Magidson and Vermunt, 2004; Muthén, 2001) and cause each individual to have different readiness to learn and be developed. These different of learning and self-development get affected from individual characteristics and surroundings. Therefore, the researcher really believes that students' characteristics are varied and can be classified into more than one group.

LITERATURES REVIEW

Mathematical process skills

Mathematical process skill is learners' ability to apply mathematic concepts to respond or solve problems in a given situations or tasks related to mathematics (Grouws, 1999). Activities used for learning mathematics in classrooms must focus on students' engagement in order for them to improve their own mathematical process skills (Reys et al., 2007; Walle, 2001). When learning mathematics, learners need to have basic mathematical knowledge and skills for future study (Schwartz, 2005). The main focus should be to develop necessary skills for intelligent enhancement which will lead students to live their lives happily and effectively in communities. The mathematical process skills consist of 5 dimensions; 1) problem-solving skills (PRS) are defined as ability to apply mathematical knowledge, problem-solving strategies, problem-solving process, and current experiences to get answers. The situations and problems for mathematics should be able to stimulate students' interests and come up with various ideas, ways and means to solve the problems (Nisbet and Putt, 200; Lyon, 2001; Adair, 2000) 2) Reasoning skills (RES) are ability to explain main concepts and scopes to draw conclusions or make decisions in different situations and contexts by using their own logic (O'Daffer, 1990; Alice and Shirel, 1994; Kulik and Rudnick, 1993) 3) Communication and presentation skills (COM) are ability to apply mathematical terminology and signs to present and explain relationship and situation of problems by speaking, writing, demonstrating, and picturing. It is ability to comprehend relations of concepts, to translate them into meaningful writing, and to be able to easily evaluate concepts that will be presented (NCTM, 1989; Kennedy and Tipp, 1994; Adams, 2010). 4) Connections knowledge skills (CON) are ability to connect mathematical knowledge with obstacles, as encountered in a situation. In other words, it means an ability to relate mathematics

with world's phenomenon (Confrey, 2007; Usiskin, 2007; Niss et al., 2007) and it can be done by analyzing and applying mathematical knowledge. 5) Creative skills (CRE) are ability to develop or achieve knowledge foundation or innovation to establish or restructure thinking process from mathematics situation into new way of problems' solving (Pelczer and Gamboa, 2011; Sak and Maker, 2006; Loewen, 1995; Gerhard, 1971). It is also extending existing ideas to be more varied in order to solve problems and develop new things.

From what have been mentioned, it is obvious that the mathematical process skills and knowledge are to be developed in students. The development process can consist of many factors and has a complex structure. In order to increase mathematical process skills, every dimension should be developed and equally focus on all of the skills.

Latent Profile Analysis

Latent Profile Analysis (LPA) is considered one of the latent structure models. It can help to classify population characteristics that are homogenous from a heterogeneous population (Magidson and Vermunt, 2004; Muthén, 2001). It is a very important tool to estimate the probability to classify members into groups (O' Connor and Colder, 2005; Vermunt and Magidson, 2002) and to identify members with same characteristics into same group. With this technique of classification, number of a group is unknown as well as group combination patterns. Indicators can be both continuous and categorical (Wang and Wang, 2012). LPAs results give both quantitative information and similar characteristics within a group as well as differences of characteristics among each group. Recently, many researchers apply this method to psychology study (Pastor et al., 2007), teenagers behaviors (Herman et al., 2007), in marketing (Wedel and Kamakura, 2001) and educational (Grunschel et al., 2013). Latent Profile Analysis model is sometimes called mixture cluster model (McLachlan and Peel, 2000) and latent cluster analysis (Vermunt and Magidson, 2002).

General sets of criteria were used to determine the model with the optimal number of profiles as recommended by Vermunt (2008) and Jung and Wickrama (2008); 1) we examined the following fit indices: the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), and the Adjusted Bayesian Information Criterion (Adjusted BIC; Nylund et al., 2007). 2) We examined Entropy values which standard value should be more than .70, indicating acceptable classification accuracy (Jung and Wickrama, 2008). 3) We examined the Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT; Lo et al., 2001) to compare the relative fit of a k profile solution with a k-1 profile solution. A significant

LMR value (p< .05) suggested that the current model with k profiles fit the data better than the k-1 profiles model and 4) we examined the Bootstrap Likelihood Ration Test (BLRT) (McLachlan and Peel, 2000; Nylund et al., 2007) to evaluate an appropriate model for the conceal group and to choose the best model.

METHODOLOGY

Participants

The data were collected from 2,485 seventh-grade students who enrolled in the academic year of 2014, in the North-east area of Thailand. This information was reported by the participants and confirmed by the parental consent letters. This is a heterogeneous group consisting of 1,073 male (43.18%) and female 1,412 students (56.82%) from 63 schools. If the categorization was divided according to the schools' size, there were 397 students (15.98%) from small schools, 850 students (34.21%) from medium schools, and 1,238 students (49.82 %) from large school. The sample was selected through multi-stage random sampling.

Research instruments

The data collection instruments used in this research were 1) problem-solving skills test, reasoning skills test, communication and presentation skills test, and connection knowledge skills test. The tests were 4 multiple choices of 40 items. The discrimination indexes by using B-index were between 0.23 – 0.89 and the reliability of each test by using Lovett's method was between 0.67 - 0.89. 2) Creativity skills test consists of 4 open questions. The discrimination indexes by using Whitney and Sabers method were between 0.33 -0.68 and the reliability by using Cronbach coefficient (α) was 0.77. The analysis of construction validity was done by using confirmatory factor analysis; 5 mathematical process skills consist of empirical data with χ^2 =6.869, df=3, χ^2/df =2.29, p-value= 0.076, CFI =0.998, TLI = 0.993, RMSEA = 0.023, SRMR = 0.008

Data collection and analysis

The data collection was done from 16th May to 15th June, 2014. The data were divided into two parts 1) measures mathematical process skills by using the test and 2) collected demographics consist of gender and school size by using data recording, recorded the individual data of gender, school size, and mathematical process skills score were divided into 5 areas: 1) problem solving 2) reasoning 3) communication and presentation 4) connection knowledge and 5) creativity. Each area had a score of 10 in total. If there was missing data more than 10%, it would not have been analyzed (Palardy, 2003). Instead, the missing data would have been replaced by Mplus program version 7.1 (Muthén and Muthén, 2009).

To answer the research hypothesis, the researcher had analyzed the data as follows; 1) analyze the data to study interaction effect between gender and school size that influence the mathematical process skills; it was done by using Two-Way MANOVA. If there had no interaction effects, the researcher would analyze separately the main effect thus: analyze the effect of gender by using Hotelling T[2], analyze effect of school size by using One-Way MANOVA, and analyzing Post hoc test by using Bonferroni method, and 2) analyze information to classify the group of mathematical process skills using LPA by considering fit index and deciding about appropriate groups include; AIC, BIC, Adjusted BIC, Entropy, LMR-LRT, LMR, and BLRT.

RESEARCH RESULTS

The results of mathematical process skills comparison according to gender and school size

The results of multivariate analysis of variance (MANOVA) showed that 1) covariance matrix of the 5 mathematical process skills was not identity matrix (Barlette's Test of Sphericity: Likelihood Ratio = .00, p-value =.00). Therefore, each of the five areas was related to each other so they were appropriated to apply MANOVA. 2) According to Variance - Covariance Matrices, each group presented different value (Box' M = 262.10, p-value = .00) which broke the agreement of equality of variance - covariance Matrices. 3) Test of the variability of each variable was done by using the Levene's test. It was found that the variability was not different in problem solving skills (F=2.02, p-value = .07) and communication and presentation skills (F=0.46, p-value = .08). For reasoning (F=3.31, p-value=.07), connection knowledge (F=10.03, p-value =.00), and creativity skills (F= 10.03, p-value = .00), they were found to have different group variability with statistic significant level of .01 which exceeded the assumption homogeneity of variance, therefore the researcher decided to apply Pillai's Trace (Table 1).

According to interaction effect results, H_0 was not rejected; therefore, gender and school size have no relevance to mathematical process skills. Moreover, if comparing the mean of mathematical process skills between male and female, statistical significant showed the result of level .05 only with problem-solving skill. The comparison of school size was different in all of the skills except for mathematical communication skills. From the overall, the large schools have better mathematical process skills means than those in medium schools except for connection knowledge skills. Additionally, creative skills of the large schools were better than in the small schools (Table 2).

From the results of group discrimination of mathematical process skills found, the 3 profile groups are an appropriate model and have the suitable capability to meet the target criteria (Log likelihood = -22953.385; AIC = 45950.770; BIC 46078.767; ABIC = 46008.867; LMRT = 624.623; BLRT = 637.939; E_k = 0. 763). Mathematical process skills of each area in profile 1 were low in all skills; therefore, it is categorized into the lowest skills group compared to other 2 groups (56.78%). Profile 2 had all indicators in the moderate level except for the

Table 1. Means and standard deviation of mathematical process skills.

Variable		Small		Medium		Large		Levene's test
		Male	**Female**	**Male**	**Female**	**Male**	**Female**	
PRS	$\overline{X}$	4.53	4.56	4.43	4.13	4.83	4.57	F=2.02
	S	2.31	1.95	2.01	2.02	2.07	2.14	p-value=.07
RES	$\overline{X}$	3.93	4.17	4.17	3.84	4.21	4.24	F=3.31
	S	1.80	1.91	1.99	1.89	2.04	2.19	p-value=.00
COM	$\overline{X}$	3.35	3.58	3.61	3.50	3.67	3.69	F=0.46
	S	1.71	1.77	1.77	1.70	1.72	1.79	p-value=.80
CON	$\overline{X}$	3.02	3.09	2.97	2.89	3.21	3.39	F=10.03
	S	1.56	1.61	1.58	1.54	1.83	2.04	p-value=.00
CRE	$\overline{X}$	0.98	1.15	1.03	0.98	1.30	1.22	F=10.03
	S	0.91	0.80	0.89	0.89	1.10	1.04	p-value=.00

Assumption: Box's M = 262.10 , F= 3.47 , df1= 75 , df2 = 3201418.66 , p-value =.00; Bartlett's test of sphericity : Likelihood Ratio = 0.00; Approx. Chi-Square = 3223.518; df = 14 , p-value = .00.

Table 2. Mathematical process skills comparison.

		Multivariate Tests						
Source	**Statistics**	**Value**	**F**	**Hypothesis df**	**Error df**	**p-value**	**Post Hoc**
gender*size	Pillai's Trace	0.006	1.440	10	4952	.156	
size	Pillai's Trace	0.025	6.171	10	4958.00	.000	
sex	Hotelling's Trace	0.005	2.253	5	2479.00	.047	
		Tests of Between-Subjects Effects					
Source	Variables	Type III Sum of Squares	df	Mean Square	F	p-value	
gender	PRS	30.729	1	30.729	7.036	.008	
	RES	2.238	1	2.238	0.544	.461	
	COM	0.136	1	0.136	0.045	.833	
	CON	3.510	1	3.510	1.108	.293	
	CRE	0.414	1	0.414	0.428	.513	
size	PRS	91.447	2	45.724	10.524	.000	L>M**
	RES	33.042	2	16.521	4.028	.018	L>M*
	COM	17.780	2	8.890	2.915	.054	-
	CON	82.795	2	41.398	13.196	.000	L>M**, L>S*
	CRE	33.272	2	16.636	17.419	.000	L>M**,L>S**

S : Small schools; M : Medium schools; L: Large schools; ** statistical significance level .01; * statistical significant level .05.

creative skills; therefore, it was categorized into the medium skills group. Lastly, Profile 3 had highest means in all skills except for the mathematical creativity; therefore, it was categorized into the high skills group (2.74%) (Table 3).

DISCUSSION

The comparison of mathematical process skill results between gender showed that the males have higher problem-solving skill than the females. This may be explained through the interpretation of the theory of development which stated that male between 11-15 years has a higher capability in comprehension to learn about abstract subjects related to problem-solving than female (Piaget, 1952). The result mentioned previously was similar to the study of Rodd and Bartholomew (2006) and Ross et al. (2012) which found that male students have an advantage in problem-solving skill and in risky tasks. Moreover, Patterson et al. (2003) and Osafehinti

Table 3. Means of mathematical process skills used to classify 3 groups.

Indicators	Class 1		Class 2		Class 3	
	Mean	S.E.	Mean	S.E.	Mean	S.E.
Problem Solving (PRS)	3.322**	0.080	5.910**	0.110	8.224**	0.154
Reasoning (RES)	3.020**	0.081	5.334**	0.092	8.342**	0.212
Communication (COM)	2.933**	0.052	4.309**	0.091	6.782**	0.227
Connections (CON)	2.646**	0.045	3.514**	0.088	7.466**	0.424
Creative (CRE)	0.924**	0.028	1.297**	0.038	3.049**	0.237
Count	1411		1006		68	
Proportion	0.568		0.405		0.027	
Mean probability	0.903		0.861		0.939	

Note: ** statistical significance level 0.01.

(1988) found that male students are likely to work better in mathematical tasks while there is no difference in other skills between male and female (Githua and Njubi, 2013; Alyman and Peters, 1993; Geary, 1996; Tate, 1997).

According to the results of the schools' size comparison, the finding shows that there are differences between mathematical process skills among schools with different sizes. The reason is that students who come from different schools size have better access to better facilities, tools and latest technology to enhance learning. The students in large schools are found to have better problem solving, reasoning, knowledge connection, and creativity skills than in medium and small schools. This might be because the mathematical contents in high school level are more abstract, hence it makes under-standing more difficult for students. Therefore, the students lack the creativity to make it concrete (Dossey et al., 2002; Fisher, 1990; Brown et al., 1990). There are also similar researches such as the research of Fredriksson et al. (2013) and Humlum and Smith (2014) which found that school size has direct effects on students' learning outcomes. Moreover, in Thai schools' systems, the larger schools have more advantages such as sufficiency of teaching materials which create more direct teaching and reinforce the effectiveness of the teachers (Thailand Ministry of Education, 2013; Bicer et al., 2013). Moreover, there are some problems of the small schools such as receiving fewer budgets, having not enough teachers, and teaching unfamiliar subjects. These factors lead to inequality in education (Girevoch, 1996; Hiroshi, 2003; Soares, 2003). However, the research found that there was no difference in communi-cation skills. The reason may be that these skills are based on learners' ability to communicate with signs and mathematical languages (Fennell and Rowan, 2001; Mummer and Sheherd, 1993; Morgan, 1999) and these skills are universal and everyone can understand in the same way even though learning contexts are different.

From the results of student's classification according to skills, the findings can prove the hypothesis. This is because the structures of mathematical process skill are complex and consist of many sub- variables. Moreover, individual differences and level of development with age give the inequality of each skills area (Raghubar et al., 2009). In addition, creativity skills seem to be the problem in every group. The problems occur due to the fact that these skills need an in-depth comprehension and real experiences (Brunkalla, 2009; Mann, 2005; Renzulli et al., 2000; Tomlinson et al., 2001) to create new outcomes. Some researchers explained that creativity is a product of new experiences that must be different from others in order to respond and fulfill the needs to solve certain problems (Sternberg and Lubart, 1991; Park, 2004). Hence, these skills are developed slower than other skills.

The development of problem-solving and reasoning skills for every group can be observed and the result indicated that these two skills are related to each other (Barbey and Barsalou, 2009; Ball and Bass, 2003; Kilpatrick et al., 2001 Battista, 1990). This result probability comes from a problem-solving process; the learners must point out the reason and give their supports appropriately (Yurt and Sunbul, 2014; NCTM, 1991). Therefore, these two skills are the skills that must be taught hand in hand and not as a separate skill. Thus, if students can solve problems; they will be able to give any reasons of how to solve them. Conversely, if students cannot solve the problem, they will not be able to give any reason. Therefore, development of these two skills can possibly do at the same time.

Suggestions

In order to measure the mathematical process skills to evaluate students' ability, the evaluation itself should be divided into sections and each indicator must be specified. The results of this technique can be evaluated to get an improvement in terms of learning environments to enhance the strength of each individual. Therefore, in order to distribute each skill, the activities should be promoted differently.

The development of mathematical process skill between male and female could be developed in class activities to promote reasoning skills, communication skills, connection knowledge skills, and mathematical creativity skills. For the problem-solving skills, there should be separation of gender. Additionally, the small and medium size schools should be rapidly improved to decrease the gap. Therefore, the organizations should take this into consideration and do something as soon as possible.

The result of mathematical process skills classification showed that creativity skill was the problem in every group because the mathematical contents are mostly abstract that are related to creative skills. Therefore, it required a longer time to develop. However, the guidelines of how to develop the skills can be done in various ways. For example, create a classroom where students can use their imagination more than contents with individual differences awareness. Schools may assign specialists to give suggestions to students on their tasks or projects that aim to share their ideas. The application of LPA with social variables is very interesting.

The method was able to indicate complex structure variables and show differences between variables. If latent profile analysis is applied together with a new method of analysis, such as Latent Transition Analysis (LTA) and Mixture Structural Equation Model (Mixture SEM), it will give various types of information. This information will indicate factors concerning the relationship of the variables. Moreover, if Longitudinal Analysis is applied, the probability of information relating to dynamic variables will be achieved easier. Therefore, it will result in deeper details. Moreover, it could be developed more in this study that mostly matches with problems.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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Educational Research and Reviews

Full Length Research Paper

Survey of Instructors on the benefits of textbooks in Turkish education departments

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Textbooks have a great importance in instructing and sharing experiences by the use of theoretical information. This study aims to present views of instructors regarding the selection and use of textbooks in Turkish education departments. For that purpose, the participants in this survey composed of 15 instructors officiating in the Turkish Education Departments at Çukurova University and Hakkâri University. In the study, data were collected by means of semi-structured interview questions. The questions were prepared by a researcher. Data were analyzed using content analysis method. Consequently, information was gathered which was related to the use and content of the textbooks that instructors of the Turkish education departments used in lectures.

Key words: Instructor, Turkish education, textbook.

INTRODUCTION

A variety of activities are implemented in order to carry out education and training studies at higher education instutions. Basically, a set of tools and equipment are required to practise these activities in a healthy way. Textbooks are the most common tools yet also differ according to current conditions and the classroom environment. *"Textbooks are essential written and printed tools which serve the purposes of curriculum, match up with content of curriculum, direct activities in lectures in the process of instruction, and aim to fill a gap arising from verbal instruction of the teaching-learning environment"* (Delice et al., 2009: 76). Ünsal and Güneş (2004) define textbooks as basic documents. These documents explain information related to subjects that contribute to curriculum and assist with information distribution in a planned and regular way. In addition,

textbooks as an information source direct and educate students in accordance with the goals of the lecture.

Textbooks have been used in a classical way since their inception, but this situaiton does not dismiss the view that they are an essential tool. It should not be forgotten that students are mainly faced with textbooks in school life and prefer the use of textbooks. Although the teacher himself can be placed at the top of the education chain as the absolute main source, the textbook is one of the main sources that dramatically affects what the student will learn as well as what the teacher will teach (Küçükahmet, 2003: 18).

The main reason for the preference for textbooks is that these materials allow lecturers to present curriculum systematically. Other reasons include the fact that acquiring textbooks is easy and a textbook is more

economic than other tools. *"Textbooks feature planning, implementation, evaluation and progress of educational activities"* (Kolaç, 2003: 107). The planning aspect of textbooks plays an important role in their selection. To Tertemiz et al. (2001:1), textbooks determine what students will learn and what instructors will teach in teaching about the learning process, especially when planned educational applications are primary sources. They express the opinion that textbooks have an important effect on decisions for both formal and informal educational activities. Textbooks also play an important role in achieving the goals of school programmes. *"Textbooks are one of the 'supplementary instruction materials' among educational tools used in the learning and teaching process of schools. Textbooks serve as the most important aids for instructors of education and are critical tools which serve as resources for teachers' and adults' learning behaviors"* (Çalık, 2001: 1).

The most important group which guides a society among these institutions is faculties of education, because these faculties are responsible for training major players in the education army, i.e. instructors. Turkish education departments were founded with the intent to make use of Turkish fairly and correctly, to teach our language and bring new instructors to the country. Turkish education departments were constituted with rich lecture content in accordance with goals established in the curriculum. Various textbooks have been required with regards to instruction suited to the requirements of the curriculum and instructor giving the lecture. Even today, textbooks are the most frequently used tools after instructors and the blackboard (Alkan, 1995, 126). Textbooks prepared for Turkish education departments should have certain features. These features include: Accomodating curriculum and lectures and serving as the base tool which students can use for their academic studies and for discovering information. It is important for university students that information in textbooks is edited specifically for them, textbooks inform point-by-point and that they are economic. In Kılıç and Seven's perspective (2004), textbooks are common instruction tools; since information is presented systematically, subjects are discussed pedagogically; they are economical and also easily accesible for students. Generally in higher education, the selection of textbooks is left to the preference of the instructor or student, and how the lecture will be given is left to the preference of the instructor. Even though this situation provides some benefits for both instructors and students, it can bring about problems in some cases. Apart from that, instructors need reference books other than textbooks for themselves as well as their students.

Many studies related to textbooks exist. Researchers who have focused on this subject along with the themes on which they conduct research are set out here: Ball and Nemser (1988), Horsley and Lambert (2001), Lubben et al. (2003), and Delice et al. (2009) studied topics related to features of textbooks as grammar and reference books. Abraham et al. (1992) analyzed the content of textbooks. McCutcheon (1981), Woodward and Elliott (1990), Zahorik (1991), and Moulton (1997) conducted studies related to the use of textbooks. Besser et al. (1999) and Synder and Broadway (2004) studied the features of university textbooks. Uzuntiryaki and Boz (2006), Çokadar and Şahin (2009) studied the use of textbooks by pre-service teachers. Some researchers such as Bulut (1999) and Kolaç (2003) studied the use of books at the level of primary education. Studies representing views of instructors related to textbooks for universities are scarcely available, but Kazazoğlu (2010) is one example.

The necessity of doing this research came to the forefront due to the inadequacy of research related to the use of textbooks in higher education in Turkey. Particularly, there are no studies that express instructors' selection, use of textbooks and experiences with them that exist. By means of this study, instructors' positive and negative experiences about textbooks in an educational format were determined.

Aim of the study

The aim of this study is to determine whether or not views of instructors who lecture in Turkish education departments are related to the selection and use of textbooks.

Limitations

This research is limited to:

1- The instructors who lecture in Turkish Education Departments at Çukurova University and Hakkari University,
2- The questions available in a data collection tool.

METHODOLOGY

The research is qualitative. In this research, we benefited from an 'interview method' which is one of the qualitative data collection methods. *"An interview is a type of communication which is maintained verbally. It provides in-depth information about the research subject,"* (Yıldırım and Şimşek, 2008: 40). Data were collected via structured interview and semi-structured interview questionnares. *"A semi-structured interview has advantages such as convenience of analysis, opportunity of self expression for the interviewee, and provding in-depth information if required,"* (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz and Demirel, 2010: 163).

Participants

Participants consist of 15 instructors who lecture in Turkish Education Departments at Çukurova University and Hakkari University. Participants were selected on a volunteer basis.

Data Collection Tools

In the study, data were collected through structured interview and a semi-structured interview questionnaire which was prepared by the researcher. The interview form was prepared in accordance with the opinions of two experts in the filed of Turkish Education.

Collection and analysis of data

The data gathered as a result of interviews were analyzed by means of content analysis method. Data were examined a few times by researcher. At first, codes were designated; afterwards, themes were determined, which are listed below. Quotations from people who participated in the research provide explanations of the codes and ensure the research is reliable. For each participant a code was assigned. For example for 'Participant 1', the code of 'P1' was assigned in the presentation of the findings in tables.

FINDINGS

Findings of the research were handled by means of three elements: 'selection of textbooks', 'use of textbooks', and 'textbooks in education and training format'.

Research findings by textbook selection and preference

Quotations, codes and frequencies from answers of the instructors to the question *"What kind of features do you pay attention to while selecting the textbook?"* are given in Table 1.

When Table 1 is analyzed, a great majority of instructors prefer appropriateness for students' level and usefulness, while the other majority of instructors pay attention to appropriateness for curriculum and syllabus in selecting textbooks.

A few instructors said that they preferred the 'textbooks to comprise subjects of the lecture'. The other instructors said that they preferred certain criterions such as 'easy accessibility, identity of the writer and the level of expertise in his/her field, appropriateness for scientific criterions, accuracy of subject index, bibliography and references, scientific features of good quality, reliability of the publishing company, being both speculative and practical, being used before, being interesting'.

Quotations, codes and frequencies from answers of the instructors to the question *"What are your remarks related to design of textbooks ?" are* given in Table 2.

When Table 2 is analyzed, a great majority of

instructors find the design of textbooks lacking in various aspects and express views about the necessity of improving them.

While one of the instructors is of the opinion 'Design is important for textbooks', the other instuctor finds textbooks sufficient in terms of design. Two instructors did not convey any views on this subject.

RESEARCH FİNDİNGS İN TERMS OF TEXTBOOK USAGE

Quotations, codes and frequencies from the answers the instructors gave to the question *"Do you give information to your students about the use of textbooks at the beginning of the term?" are* given in Table 3.

When Table 3 is analyzed, it could be seen that all of the instructors give the answer "yes" to the question "*Do you give informatin to your students about the use of textbooks at the beginning of the term*?".

Quotations, codes and frequencies from the answers of the instructors to the question *"Does developing technology affect the use of textbooks? Why?"* are given in Table 4.

When Table 4 is analyzed, it is seen that a great majority of instructors are of the opinion "Technology affects the use of textbook". A few of the instructors are of the opinion "Technology partly affects the use of textbook." Two instructors express the opinion that technology does not affect the use of textbook.

Quotations, codes and frequencies from answers of the instructors to the question *"Do you prepare questions by making use of textbooks for midterms and final exams?"* are given in Table 5.

When Table 5 is analyzed, it is seen that a great majority of instructors say "*yes*" to the question "*Do you prepare questions by making use of textbooks for midterms and final exams?*". A few of the instructors gave the answer "*no"*. One of the instructors did not remark.

Research findings related to textbook usage in terms of education and training

Quotations, codes and frequencies from the answers of the instructors to the question *"Do you find compatible content between textbooks and the Turkish education programme?"* are given in Table 6.

When Table 6 is analyzed, it is seen that five instructors say *"yes"*, four of the instructors say "*partly*" and two of the instructors say "*no*" to the question *"Do you find compatible content of textbooks and Turkish education programmes?"*. It is interesting that four of the instructors do not remark on this question.

Quotations, codes and frequencies from the answers of

Table 1. Views of instructors regarding elements they consider while selecting textbooks.

Codes	Frequency	Quotations from remarks of ınstructors
Being useful and appropriate for students' level	7	[…] *I select the one which is easily accessible and appropriate for their level* […] (P.2)
Being appropriate for curriculum and syllabus	6	*I pay attention to whether it is appropriate for the programme that I will apply,* […] (P.6)
Comprising the subjects of the lecture	5	*I select the textbooks which include the lecture subjects that will be handled.* […] (P.11)
Being easily accesible	3	[…] *I pay attention to whether or not it is easily accesible and utilizable* (P.6)
Identitification of the writer and amount of experience in his/her field	3	*The writer of the textbook is important for me. The textbooks which the writer has published before, the school which the writer graduated from, his/her approach to the lecture...* […] (P.13)
Being appropriate for scientific criterions	2	[…] *Scientific qualification of the textbook* […] *takes an important place.* (P.3)
Accuracy of the subject index, bibliography and references	2	[…] Certain information such as s*ources which are used and referenced in writing of textbook,* printing quality, publishing company, and design of textbook play an important role in textbook preference. (P.3)
Morphological properties of good quality	2	[…] Sources which are used during the writing of the textbook and taken as references, *quality of printing,* publishing company, *design of textbook,* […] take an important place for preference of textbook. (P.3)
Reliability of the publishing company	1	[…] *publishing company,* design of textbook, usefulness, academic identity of the writer play an important role in textbook preference. (P.3)
Being both speculative and practical	1	[…] *In my opinion, the textbook which is selected should benefit by means of both its speculative and practical aspects.* (P.7)
Textbooks which have been used before	1	*Firstly, I look into main sources which have been used before.* (P.11)
Being interesting	1	Content of textbook is preferential, but usefulness and *interestingness are also quite important.* (P.12)

*Because an instructor can remark more than once to this open-ended question, numbers on the table correspond to the number of remarks.** 'P' stands for 'Participant'.

Table 2. Views of instructors related to design of textbooks.

Codes	Frequences	Quotations from remarks of ınstructors
Designs of textbooks are lack of some ways and they need improving.	11	*Quality of printing of the textbook, visual elements which are included in it, clarity of pictures, drawings and graphics have importance in terms of the usefulness of the textbook.* (P.3)
The instructors who did not remark	2	-
Design is an important element for textbooks.	1	*Textbook design is one of the most important aspects that gives information about the content of the textbook.* […] (P.10)
Textbooks are sufficient in terms of design.	1	*I use books such as novels, stories, etc. which were printed in different publishing companies in my lectures and these are generally better quality.* (P.15)

* 'P' stands for 'Participant'.

Table 3. Views of instructors Related to Providing Information to Their Students About Textbooks at the Beginning of Term.

Codes	Frequences	Quotations from remarks of ınstructors
Yes	15	*I inform my students about the textbooks which I will use.* (P.2)

* 'P' stands for 'Participant'.

Table 4. Views of the instructor Related to the Effect of Developing Technology on Textbooks.

Codes	Frequences	Quotations from remarks of ınstructors
Technology affects the use of textbook.	9	*Developing technology certainly affects the use of textbook. For example: e-books come to the forefront of our system of education. I believe a lack of innovation of textbooks affects education negatively in this important age of rapidly-developing technology and science.* (P.7)
Technology partly affects the use of textbook.	4	*It has a partial affect. Students prefer information that is already prepared rather than textbooks. It partly affects our usage. But, this effect is not heavy because we pay attention to presentations during lectures. Generally we give homework from the textbooks. They are used for reading texts, etc. Students still utilize and take advantage of textbooks which are well coordinated with technology.* (P.8)
Technology does not affect the use of textbook.	2	*It has no affect. Technology and textbooks support each other.* (P.14)

* 'P' stands for 'participant'.

Table 5. Views of instructors related to preparing questions by making use of textbooks for midterms and final exams.

Codes	Frequences	Quotations from remarks of ınstructors
Yes	10	*I prepare in this way so that students can understand more easily.* (P.2)
No	4	*I do not utilize textbooks so much. I create my questions based on the subjects from the lectures.* (P.11)
Instructors who did not remark	1	-

*'P' stands for 'Participant'.

Table 6. Views of instructors related to whether or not content of textbooks and Turkish education programmes are compatible.

Codes	Frequences	Quotations from remarks of ınstructors
Yes	5	*In my opinion, content of textbooks and Turkish education programmes are compatible.* (P.7)
Partly	4	*I do not utilize textbooks so much. I create my questions based on subjects from the lectures.* (P.11).
Instructors who did not remark	4	-
No	2	*There is not a textbook related to the lecture "Language and Culture" available.* (P.9)

* 'P' stands for 'Participant'.

Table 7. Views of instructors related to positive aspects of textbooks in terms of ınstruction.

Codes	Frequences	Quotations from remarks of ınstructors
Textbooks present subjects as systematic, well coordinated and whole.	7	Textbooks are positive in terms of presenting subjects as *well coordinated, whole* and appropriate for the level of the students. (P.1)
Textbooks make a certain discipline and plan.	3	Textbooks lead students. *They present subjects in a graduated manner.* (P.14)
Textbooks are the most common reference guides.	2	*Textbooks have positive functions in completing theoretical information related to my lecture and sampling.* (P.15)
Textbooks are accesible.	2	Textbooks are *accesible* and economical. (P.2)
Textbooks save time.	2	Information which exists in a well- coordinated textbook is important in terms of access to sources and *saves time.* (P.9)
Textbooks make subjects appropriate for students' levels.	1	[…] *giving information as appropriate for students' levels.* (P.1)
Textbooks are economical.	1	Textbooks are accesible and *economical.* (P.2)
Textbooks suggest different sources.	1	[…] Also, *suggesting different sources is* important in terms of contributing to instruction. (P.3)
Textbooks help for following and repeating subjects.	1	Students take the opportunity to follow and repeat material they learn by the use of textbooks. (P.10)
Textbooks are scientific.	1	*Because subjects are constituted by domain experts in order to attain goals of the lecture, I think that textbooks are more consistent, purposeful, scientific, well organized and rich in terms of content than other sources.* (P.13)

*Because an instructor can remark more than once to this open-ended question, numbers on the table correspond to the number of remarks.** 'P' stands for 'Participant'.

the instructors to the question *"What are the positive aspects of textbooks in terms of instruction?"* **are** given in Table 7.

When Table 7 is analyzed, it is seen that a great majority of the instructors are of the opinion

"*Textbooks present subjects as systematic, well-coordinated and whole.*"

A few of the instructors are of the opinion *"Textbooks help attain a certain discipline and plan"*. Views of the other instructors can be arranged in order as "*being most common reference guide, being accesible, saving time, making subjects appropriate for students' levels, being economical, suggesting different sources, helping for following and repeating subjects, being scientific*".

Quotations, codes and frequencies from answers of the instructors to the question "What are the negative sides of textbooks in your mind in terms of instruction?*" are* given in Table 8.

When Table 8 is analyzed, it appears that a great

majority of instructors are of the opinion "*Utilizing one book and preventing the use of other sources*" are negative effects of textbooks in terms of instruction.

Two instructors are of the opinion "*reducing the habit of doing research*" is the most negative aspect. Other views of the instructors can be expressed in turn: "*steering away from technology, cutting down on the interest level of students in lectures, limiting lectures*".

Quotations, codes and frequencies from the answers of the instructors to the question "What do you suggest about the use of textbooks in terms of instruction?*" are* given in Table 9.

When Table 9 is analyzed, the opinion "*textbooks should be used with different tools and sources*" became the opinion which was expressed most frequently.

Three instructors are of the opinion "*textbooks should be appropriate for new curriculum and they should be given importance*". Other views of the instructors can be expressed in turn "*research and approaches to developing textbooks should be given importance, views of students should be gathered while creating textbooks, research of textbooks should be prioritized, textbooks*

Table 8. Views of instructors related to the negative aspects of textbooks in terms of ınstruction.

Codes	Frequences	Quotations from remarks of ınstructors
Utilizing only one book and avoiding the use of other sources.	12	*The thought that only one book is sufficient,* […] (P.1)
Reducing the habit of doing research.	2	No utilization of different sources, *the habit of not doing research, etc.* (P.6)
Steering away from technology.	1	The instructor can hold to the textbook *and steer away from technology.* (P.1)
Cutting down on the interest level of students in lectures.	1	*If a lecture which is centered on the textbook is given, the interest level of students cuts down.* […] (P.8)
Limiting lectures.	1	Textbooks occasionaly result in limited samples and expressions. (P.15)

*Because an instructor can remark more than once to this open-ended question, numbers on the table correspond to the number of remarks.
** 'P' stands for 'Participant'.

Table 9. Views of ınstructors related to their suggestions about the use of textbooks.

Codes	Frequences	Quotations from remarks of ınstructors
Textbooks should be used with different tools and sources	7	[…] *Different sources should be utilized instead of only one textbook.* […] (P.11)
Instructors who did not remark	4	-
Textbooks should be appropriate for new curriculum and they should be updated according to curriculum	3	*Available textbooks should be updated according to new curriculum,* […] (P.2)
Research and approaches to developing textbooks should be given importance	2	*All approaches which can develop textbooks should be researched and examined.* (P.4)
Remarks of students should be gathered while creating textbooks	2	[…] *Preparing a detailed report should be considered for textbook improvement.* […] (P.11)
Research of textbooks should be a priority	1	*Textbooks should be researched and selected more carefully.* (P.7)
Textbooks should direct students	1	[…] *Textbooks should be directive and instructive.* (P.14)

*Because an instructor can remark more than once to this open-ended question, numbers on the table correspond to the number of remarks. ** 'P' stands for 'Participant'.

should direct students". It is interesting that four of the instructors did not remark about the topic.

DISCUSSION AND CONCLUSION

Findings of the research were handled by means of three elements, including: 'selection of textbooks', 'use of textbooks', and 'textbooks in education and training format'. According to this, a great majority of the instructors take students into consideration in terms of selection and preference of textbooks while making a selection. It is taken into consideration that the textbook is appropriate for students' level and also useful. It is seen that the instructors who participated in this study prefer a student-centered approach. The instructors agree with each other about not being in the level of what is wanted and the existance of various areas in which textbooks are lacking in terms of design. This shows that design as important as content.

All of the participants give information about the textbook they use in lectures at the beginning of the term. Thus, students are directly informed by the instructor about textbooks which they will benefit from. A great majority of the instructors are of the opinion that technology affects the use of textbooks. According to this, the technology, an element that this age requires, affects the use of textbooks. In this study, we see that a great majority of the instructors benefit from textbooks for the exams. Views which come from the instructors about the suitability of textbooks which exist within the Turkish education programme differ. But, while a few of the instructors find textbooks and programmes compatible, other instructors find them only partly compatible. It is interesting that the same number of instructors did not remark. This calls to mind questions about the instructors who give lectures in the Department of Turkish Education.

That integrating, planning and ensuring subjects are well coordinated are regarded as the most important aspects of textbooks. When viewed from this perspective, instructors see textbooks as a guide for themselves and tools which can be prescribed by integrating the lectures that they deliver. A great majority of the instructors achieve a consensus on the problem which is caused by keeping to only one textbook. They agree about the negative aspects of textbooks in terms of education and training. Studying by keeping to only one textbook is thought as a negative situation which can cause a reduction in research, drift away from technology, or make the instructors lazy. In the study, the opinion "textbooks should be used with different sources and tools" is a top suggestion the instructors gave about the use of textbooks. There are studies about some problems related to better constituting textbooks for scientific studies and contemporary developments and design for providing meaningful learning. These problems can be solved in the light of evaluations with updating and restructuring (Karatay and Pektaş, 2012: 185).

RECOMMENDATION

Consequently, instructors who lecture in Turkish education department do not want to benefit from only one textbook. All participants agree with the opinion that various sources and technology should be used with textbooks. Constructivist education approach suggests that various sources should be utilized. Also, the opinion that design is important as far as content comes into prominence. Old types of books can not be accepted. Raising the quality of textbooks also raises the quality of education and assists in reaching the goals expressed in the curriculum. Therefore, these suggestions related to textbooks which are used and benefited from should be considered:

1- It is required that the design of textbooks should be considered as far as content and the designs which are appropriate for content and ease environments of learning should be prefered.
2- Nowadays, classical instruction methods are no longer sufficient. It is important that textbooks be used along with other tools and materials.
3- While preparing textbooks, criterions of suitability for students' levels should be regarded.
4- Textbooks should be compatible with the lectures of Turkish education departments.
5- While preparing textbooks, opinions of not only experts but also students should be taken into consideration in order to make them more useful.
6- It is thought that conducting various studies which evaluate the views of students will support this study by increasing research related to textbooks used in Turkish education departments.

Conflict of Interests

The author has not declared any conflict of interests.

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