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Message from the Editor-in-Chief

I am very pleased to publish second issue in 2014. As an editor of International Online Journal of Primary Education (IOJPE), this issue is the success of the reviewers, editorial board and the researchers. In this respect, I would like to thank to all reviewers, researchers and the editorial board. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to International Online Journal of Primary Education (IOJPE), For any suggestions and comments on IOJPE, please do not hesitate to send mail.

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EMPHASES OF PARENTING IN THE LIGHT OF THREE COMPARISON GROUPS

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ABSTRACT
Parenthood is a phenomenon that is not easy to approach through research. This study analyzed the emphases of parenting in the light of three comparison groups. The basis of the research was grounded on Bradley's (2007) theory of six fundamental parenting tasks. This was a case study in which parenthood was studied among one second-grade classroom. The teacher, 18 parents, and 19 pupils were recruited in the study. The data comprised three sets as well: questionnaires for parents, pupils' essays and drawings, and the teacher interview. The data were collected in 2012. The analysis represented theory-led content analysis. The results showed that the emphases of parenting tasks varied among the comparison groups and the emphases are illustrated in a triangle showing the variation. The most important task was the present parent who loves the children, and discusses and gives time for them. The role of parental love as the fundamental basis of parenting is discussed.
Keywords: parenthood, upbringing, education, parenting, family, parent-child relationship

INTRODUCTION

Every one of us has some experiences of parenting, if not of one's own but others'. Parenthood is also a very personal experience because everyone does parenting in his or her own way, or has unique experiences of parenthood. Thus, parenthood involves quite powerful opinions as well, but it also includes responsibilities that are provided by national laws and the international agreement on children's rights (United Nations, 1989).

This study focused on parenthood from the points of view of parents, children, and teachers contributing a new perspective on parenthood research. The study was strongly theory-led: the analysis was based on Bradley's (2007) theory of six fundamental tasks of parenting. As the conclusion, the foci of parenthood are illustrated and further discussed.

Perspectives on upbringing and parenthood

The perception of parenthood is the way of seeing what makes a parent and what are the responsibilities and rights in parenting (Austin, 2007). Roles are a pertinent part of parenthood, and

commonly, parenthood is seen as a way of being a father and a mother in order to help and raise the child to grow and develop (Määttä & Uusiautti, 2012ab; Leinonen, 2004). In addition, permanence is one dimension of parenthood. Not only is it a common knowledge, but also the family law says that a parent is a person who takes care of a child and gives preference to the child's needs not just for a day but for a longer period of time (Alstott, 2004). Kristeri (2002) defines parenthood as a growth process referring to the fact that a parent also develops all the time. Therefore, there is not any absolute definition of parenthood but merely it is a complex and multidimensional process defined also by the child's developmental phases and personal characteristics (Crnic & Low, 2002).

Parenthood is also connected to the concept of a family. During the past decades, the idea of a family has changed considerably, and the definition is not as straightforward today as it used to be (Matinlompolo, 2007). Consanguinity does not solely define a family, but nowadays it can be more relevant to consider family similar to a life span, constructing through events in life (Jallinoja, 2000).

Many parenting studies have focused on stress and other modern phenomena, such as hurry, efficiency expectations, and unstable relationships (Crnic & Low, 2002) that do not only affect parents but children too (Huhtanen, 2007). Also the internet and media have influence on family life and upbringing (Deater-Deckard, 2004; Wilenius, 2002)—and the influence is not always a positive one (Lämsä, 2009; Uusikylä, 2006).

In order to support children's well-being in a best possible way, responsibility of upbringing and education is shared between parents and professional educators (Huhtanen, 2007; Tilus, 2004). Interaction, partnership, and equal conversation are of primary importance when talking about the educational partnership between a teacher and a parent (Cantell, 2011). The school and teachers have plenty of opportunities to enhance children's well-being but the influence can also be negative (Tilus, 2004). Although home-school partnership is to share the responsibility, parents can perceive the relationship threatening. As the institutional education happens with or without the parent, from the parent's point of view, his or her role in raising the child has diminished (Alasuutari, 2003).

The purpose of education partnership between home and school is to support children's development and growth and enable possible early intervention (Cantell, 2011; Hujala et al., 2009). This partnership pursues creating a holistic picture and interpretation of the child's behavior. This requires genuine interest from adults, and their ability to communicate with each other (Huhtanen, 2007; Whitmarsh, 2011).

Holistic parenthood

The latest research has emphasized parenthood as entity instead of separate parenting actions (Perälä-Littunen, 2004). In the 1960s' psychology research, Baumrind introduced a concept of *parenting style* referring to the holistic parenting and parenthood. Three styles were distinguished: authoritarian, authoritative, and permissive (Baumrind, 1989). Authoritative parenting is based on meeting the child's needs, setting limits, acting as the authority, democracy, and supporting the child's independency (see also Määttä & Uusiautti, 2012a; Valkonen, 2006).

Parenthood as a concept and a phenomenon is wide and various theories have attempted to divide parenthood into certain areas. For example, Collins, Madsen, and Susman-Stillman (2002) have presented contents of basic parenting tasks: (1) controlling the child's behavior; (2) supporting the child's sense of responsibility and fending for oneself; (3) promoting the emergence of positive relationships in the child's life; and (4) enabling and supporting outer-family experiences. Success in controlling the child's behavior depends on parents' ability to talk about their expectations for, give feedback to, and supervise the child. As the child grows, the control diminishes and the child has more responsibility over his or her behavior.

According to Steinberg and Silk (2002), the primary dimensions of parenting relationship are harmony, autonomy, and ability to solve conflicts. Harmony refers to the warmth of the relationship, expression of feelings, and engagement whereas autonomy means the level of controlling the offspring. The latter dimension refers to the nature of the relationship and whether it is merely continuing or disinclined.

From the point of view of positive psychology, Martin Seligman (2002) has named eight principles of parenthood. These include creating safe attachment through immediate, constant care, teaching the significance of acts and its relation to control, and continuity in using the words "yes" and "no". Parents should also compliment and punish the child in a well-balanced way and when justified. Sibling rivalry can be prevented by emphasizing the child's individuality and strengths. Seligman argues that the golden moments of going to bed should be valuable for the parent and used for discussing with the child. Agreements should be made in a good spirit in order to reinforce positive action. The parent should concentrate on promises that deal with positive achievements and develop strengths (Seligman, 2002). These principles have emphasis on balance and presence—like in many other theories as well.

The holistic approach to parenthood is also evident in perceptions of what is good parenthood. For example, Perälä-Littunen's (2004) study of good motherhood from the adults' perspective brought up care, positive influence on the child's development, and meeting the child's needs. Likewise, Hietanen et al.'s (2012) study of good fatherhood narrated by children covered similar kinds of elements. In this study, seven types of good fathers were distinguished: (1) the active father spending plenty of time with children, (2) the caring and nurturing father, (3) the disciplinarian father, (4) the exemplary father, (5) the father in a respected position, (6) the father participating in household work, and (7) the fair father. According to Valkonen's (2006) study, not just one dimension of a good parenting is enough but the overall perception of good parenthood is a sum of many elements.

Bradley's (2007) theory of six basic tasks of parenthood includes various dimensions that belong to parenting (Table 1). The theory can also be used for supporting the life of families in challenging circumstances, and to show how to support children's healthy and safe development. The tasks presented in the theory are primary tasks, and because of the fundamental nature of the theory, it was also selected in this study (see Bradley, 2007; see also Holden, 2010; Holden, Vittrup, & Rosen, 2010).

TABLE 1
Fundamental Tasks of Parenting (Bradley 2007, p. 109)

Safety/sustenance	
Household structure & arrangements	Access to food
Neighborhood surroundings	Access to health care
Exposure to teratogens	Protection from imminent harm
Socio-emotional support	
Responsiveness & sensitivity	Warmth & affirmation Negativity/intrusiveness
Discipline practices	Assistance with emotion regulation
Expectations	Encouragement & guidance
Positive affectivity	Modeling of mature behavior
Communication	
Stimulation (instruction)	
Toys & learning materials	Provision for lessons Culturally enriching
Direct instruction	experiences
Language & literacy exposure	Encouragement of achievement
Exposure to media	Recreational activities
Coaching	
Surveillance (monitoring)	
Proximity/visual contact	Data gathering from child
Direct data gathering about child	Indirect data gathering about child

Structure	
Family routines	Rituals
Organization of activities	Time management Scaffolding
Organization of physical environment	
Social connectedness	
Relatives & friends	Non-familial social networks
Community institutions	Work connections
Child's peer networks	

METHOD

This study compared perceptions of the emphases of parenthood. The study represents a case study in which parents', children's, and a teacher's perceptions of parenthood were contrasted. On the one hand, the purpose was to analyze the shared conception of parenthood, and on the other hand, also how the conceptions differed from each other. Bradley's (2007) theory was used as a theoretical framework.

The following research questions were set for the study:
  (1) How do parents, children, and the teacher describe parenthood?
  (2) What similarities and differences do the descriptions of parenthood have?

The study was conducted in a middle-size school in northern Finland, among second-graders. The participants of the research were 18 parents, 19 pupils, and the teacher of the grade. Parents (13 women and 5 men) were 30–50 years old. Majority of the parents had graduated from higher education and relatively many (n=5) of them worked in the field of education. Most of the participants represented nuclear families with parents and their common children. Ten of the pupils were girls, and nine boys. The grade had altogether 24 pupils, but three of them were not allowed to participate in the study and two were absent from school when the data collection took place. The teacher had worked as a teacher for 25 years of which the last 15 years among grades 1-3.

The data were collected with various methods. The methods were selected based on the participant groups' abilities and availability. The parents were approached with an electric questionnaire that was sent them by email. This was considered a good way of reaching parents for research purposes. The parents were informed of the research in a parents' meeting at school and they were also given the permission forms concerning their children's participation in the research. The questionnaire included both open questions that parents could answer freely and multiple-choice questions. Open questions concerned for example the values, rules, and punishments used at home. Structured questions covered the evaluations of parents' support and time spent together (e.g., How much do you support your child with the following issues related to school? Evaluate with the scale from 1 to 5, one being very little and 5 very much). The questionnaire included 24 questions including background questions.

This means that pupils were asked to write an essay and draw about what they do with parents. The title of the essay was "My parents". The pupils were also given auxiliary questions (e.g., What do you do together with your parents?; What is the best/worst in your parents?; How do your parents help you?; etc.) to help writing. The drawing was supposed to illustrate what the pupils do with their parents. Behind the paper, the pupils were asked to write about the picture.

The teacher was interviewed with a semi-structured theme interview. The interview questions were designed beforehand but the sequence could be changed based on how the interview goes on. The interview took place at the end of the semester when the busy school year was over but the summer holiday had not begun yet. The teacher was allowed to familiarize with the interview questions beforehand. The questions covered various sides of parenthood (e.g., What are parents' responsibilities

from the pupil's point of view?; What is bad parenting in your opinion? Please, provide an example; etc.) and how parents could support children's everyday life.

All data were analyzed with content analysis, each set of data with a suitable application of it (Tuomi & Sarajärvi, 2009). The qualitative content analysis was theory led as Bradley's (2007) six categories were used as the main categories. On the one hand, it provided a good basis for categorizing three various sets of data, making their analyses comparable. On the other hand, new issues could emerge within the categories and the existing theory of parenting could be evaluated through the results.

The parent questionnaires were analyzed qualitatively although they included also quantitative data. However, it was more important to study the nature of parenting and therefore the emphasis was on the expressions and emphases in the participants' answers. This was how the teacher interview was analyzed, too. After writing the transcript, the simplified expressions were categories into the predetermined six categories.

The pupils' essays and drawings were also dissected from the point of view of Bradley's parenting tasks. Content analysis of drawings can be divided into four main phases: selection of pictures, categorization, coding, and analysis (Rose, 2007). In practice, the pupils' drawings were divided into the six categories but instead of counting the incidence of parenting tasks, we analyzed what each drawing tells about the theme. The analysis of drawings had several codes with which each drawing was analyzed. All codes were written carefully to guarantee systematic analysis of every drawing. For example, it could be analyzed whether the doing illustrated in the drawing could be seen as mutual or shared activity with the parents or not. Pupils' explanations on the back of the drawing helped considerably in figuring out how to interpret the drawings. The analysis of pupils' essays followed the same idea and expressions describing each category were gleaned from them.

The results section included excerpts from the data. Parents are referred with a number and F "Female" and M "Male", and children with a number and letter "C". Quotations of the teacher interview have been marked without a number. The data excerpts are to illustrate the data and support the researchers' the interpretations.

RESULTS

The research results will be presented following Bradley's (2007) theory of the six fundamental tasks of parenting. The themes are therefore theory-bound but the results show the case-study-specific emphases.

*The task providing **safety/sustenance*** was strongly emphasized in the viewpoints of each comparison group. More than anything, participants reported sufficient nourishment, exercising, and rest as the key parenting tasks. The teacher stressed all these three very clearly as the teacher thought that they ensure the safe basic life for children.

"All basic things there (at home): sleep rhythm, dining, sufficient nourishment, and exercising. Having them all in balance."

Also parents valued these three basic needs:

"(The basic values are) sleep, food, exercise" (F8)

However, parents' had slightly different emphases between these three. Most importantly they talked about sufficient sleep, and providing food came second. Instead, exercising and sports were named as areas in which parents had less control although they mentioned that they use to exercise with their

children. Actually, this was the most important form of doing things together with their children. Thus, it seemed that parents do not want to decide their children's sportive hobbies as such but do exercise with their children.

Children, on the other hand, reported that providing food was the most salient parenting task. Likewise, children told that they exercise with their parents. Spending time outdoors and exercising was also a typical theme in children's drawings. Children did not mention about sufficient sleep in their answers.

According to this case study, ***socio-emotional support*** as a parenting task can be described by one word: the word is love. Parental love was a combining factor in the answers of all three research groups. Naturally, parental love is a part of all tasks of parenting but in the data it seemed have more emphasis when considering the socio-emotional support. The teacher reflected love at an abstract level but the parents' answers had more concrete examples of how love is manifested as action at home. Children's answer described love as their positive position as the receivers of parental love.

The teacher emphasized parents' unconditional love toward their children in all parenting. Parental love should be the fundamental force whether the question was about setting limits, punishing, or handling of difficult feelings. When asking the teacher to name three most important values related to parenthood the teacher mentioned unconditional love the first. Many contents and tasks of parenting can be realized through sincere love.

"Well, the first one is probably to love the child genuinely and sincerely, and that means attention and care for the child. It shows, if you love the child truly, it includes so much."

Not surprisingly parents considered love and closeness important. Some of them regarded these as the most valuable.

"Paying attention to others, love." (F15)

In addition, parents reported that they tend to show affection to their children openly:

"I would like that my children felt that they can come to dad's and mom's lap always, both in good and bad days. Kisses, affection, laugh, and sincerity are things that I would like to be manifested in my family." (M16)

The children's writings confirmed that love, positive words, and other favorable experiences are meaningful and feel good. The children told that these things are the best in parents. Joy and happiness as the outcome of closeness were evident in children's drawings, too.

"What is the best in my parents, is that they like me." (C19)

The only conflicting result in the data concerned the setting of limits and punishments. Parents used considerably time to describe the rules and punishing methods they had at home while children thought that rules and punishments set by parents were the worst things in parenting. In all other issues, children clearly either confirmed positively or described neutrally their parents' action. Rules and punishments were, however, seen negatively.

On the other hand, it is worth noticing that punishments are to teach children because they have done something wrong, and they are not even supposed to feel nice. Children's negative experiences therefore support the parents' answers: they have been guided and punished by parents.

Stimulation (instruction) as a part of parenting was strongly connected with school. Parents, children, and the teacher emphasized quite different things when it came to support of children's studies. Parents considered that it is important that children enjoy going to school and that they care of that children do their homework. Otherwise, parents did not intervene in their children's school life or told that they are relatively little interested in it. However, children reported—which was quite the opposite of what parents told—that parents help them a lot with homework.

"The best thing is that they (parents) help with homework." (C4)

"My parents help me if I have difficult homework." (C9)

Some children did certainly mention that they need more help with homework. The teacher's perspective to parents' support focused merely on the general support a child needs and on encouragement. The teacher brought up the fact that parents' interest, encouragement, and support correlate to children's academic success and motivation at school.

"Well, at least I think it is obvious that if the parents are interested in their child's school going, they want to support and spur, and this keeps up the motivation and the school success will then reach the level that is possible to that particular child. Maybe even better than one could predict."

Parents and children mentioned also other stimuli of which the most salient were various hobbies. Children described how parents take them to hobbies while parents emphasized hobbies as way of doing things together.

Surveillance as a parenting task includes monitoring of the child's doings and development. Proper surveillance necessitates communication with the child which became the most important element of surveillance in this study. Parents, children, and the teacher all considered mutual discussions and spending time together significant. Communication and shared time partly relate to the socio-emotional support, and it seems that it is challenging to classify strictly all the tasks parenting involve. Also the teacher told that for children, already the parents being available and arranging time to spend with children is important. They are the ways of maintaining the connection in addition to communicating and listening to the child.

"Being present in the child's everyday life and close all the time, available, and have time, listen to the child. So that the interaction with the child becomes genuine. The child understands that he or she is loved and heard."

The teacher also told that when listening to a child, the atmosphere should be safe. Indeed the teacher had advised the parents to have a peaceful moment with a child every evening before bed time. The moment can be used for talking about the happenings of the day. The parents' answers showed that they actually followed this advice quite well because they reported how they arrange time for discussing with their children. Parents also talked about other discussions they have with their children during the day, everyday discussions that occur naturally.

"I discuss how the day has gone." (F1)

"I talk with the child daily…. Our connection is quite tight every single day." (F5)

Children's writings and drawings highlighted the meaning of listening, too. Children described communication with their parents with speech bubbles that included short communications. Writings also had mentions about the lack of communication and listening.

"It sticks when my parents do not listen to me." (C13)

On the other hand, children told that the time spent with parents was the best. Especially, they loved toying and playing with parents.

"The best in my parents is when they play with me." (C18)

"The best in my parents is that they are outdoors with me." (C19)

Structure was manifested somewhat similarly as safety as a parenting task in these data. Sleep, nourishment, and exercising create routines and a certain structure for daily life. The teacher also brought up how these tasks must occur as a matter of routine. The way these two areas of parenting tasks are interconnected means that the fulfilment of physical needs is a central issue in the everyday life, and thus forms a salient structure in the family life.

Parents also highlighted separately that routines and a regular rhythm of life are extremely important and valuable. The teacher stressed the child's point of view: the child does well when the basic everyday life goes well meaning that the child has a safe framework and routines at home. In other words, the parents has to take care that the everyday life has a functional structure.

In this study, ***social connectedness*** was mainly seen from the points of view of school and hobbies. According to the data, it became evident that parents help their children to maintain social relationships, especially when it comes to peer relationships. Parents told that they help their children to communicate with their friends and that they discuss peer relationships with their children. In addition, parents reported that they encourage their children if they need it in their relationships with other children.

"(Do you help your child in something?) Communication with friends." (F3)

"Our second-grader has needed help mostly with…things related to social skills. When the child is naturally shy, plenty of encouragement is needed." (M16)

Children also expressed their parents' support in social relationships. They wrote that they need parents' help in conflicts with friends, and usually they got help. This is how parents foster children's social connectedness.

"Well, my parents help me if I have e.g. some arguments." (17)

Especially, the teacher highlighted the significance of the development of social skills in children's social relationships. In the teacher's opinion, it the parents' task to monitor whether the child has friends or not, and to guide and support the child in peer relationships. All children do not necessarily talk much about school at home and therefore parents need the skill of reading between the lines in order to find out the child's friendship situation at school.

DISCUSSION

The research results show that parents, children, and the teacher had more or less similar understanding about parenting tasks. They pointed out similar issues and areas of parenting. On the other hand, there were tasks that could be emphasized by only two participant groups, one of the group having a different opinion or not mentioning the task. Thus, the emphases of the importance of different parenting tasks could differ.

Figure 1 illustrates how the groups in this case study understood parenting. Each apex of the triangle refers to one comparison group. Emphases included inside the triangle describe how important each parenting task was from the point of view of the comparison group. The closer the task appear to an apex, the more important the task was in the emphases of the group. The center of the triangle includes parenting task that every group considered important.

The strongest emphasis was on providing nourishment and socio-emotional support. These can also be found from Maslow's (1987) hierarchy of needs according to which the basic needs are physiological by nature (e.g., food and sleep). According to Bornstein (2001), parents have to fulfil children's biological, physical, and health-related needs.
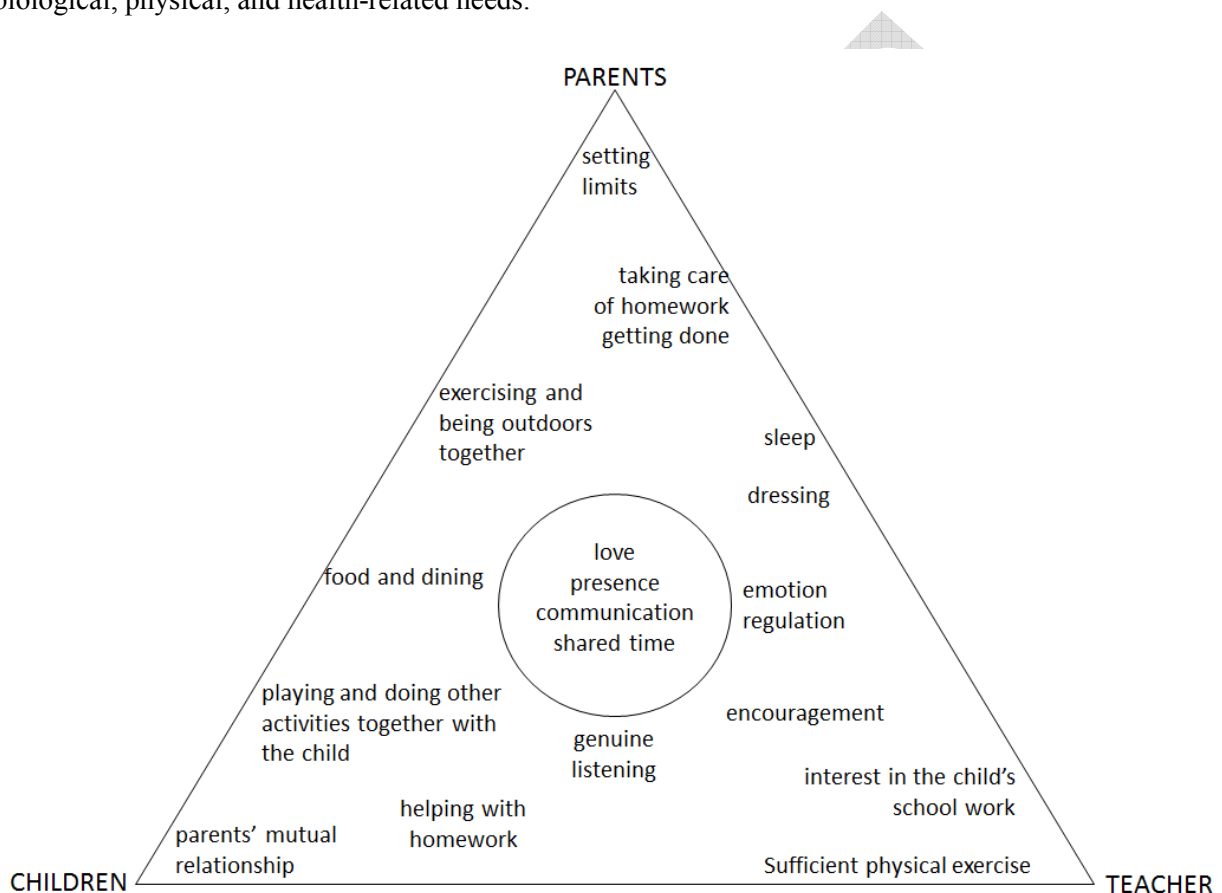
FIGURE 1 Emphases of parenting in the light of three comparison groups

The comparison groups also stressed the importance of a parent being present and loving through discussing and giving time. These parenting tasks are located in the areas of socio-emotional and surveillance (Bradley, 2007). The need of bonding and the sense of togetherness follow the physiological needs in the hierarchy (Maslow, 1987). Bradley does not make any hierarchical categorizations but it can be interpreted that the shared emphasis among the participants of this study has an important role in parenting.

Although the categorization of basic parenting tasks was used for analyzing the research results, it seemed sometimes difficult to distinguish categories from each other. For example, the presence of a parent and time spent together with a child was repeatedly referred to in the answers. However, these tasks could be located in many categories as they could provide safely, stimulation, or socio-emotional support. Indeed, the parent's presence has had plenty of emphasis on several theories of parenthood (e.g., Helminen & Iso-Heiniemi, 1999; Pulkkinen, 1994; Seligman, 2002). Moreover, the time parents

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spend with their child is related to responsible parenting (e.g., Arendell, 1997; Beck-Gernheim, 1992; Böök & Perälä-Hiltunen, 2010) and make a significant part of studies on good parenthood (e.g., Sheridan & Burt, 2009; Valkonen, 2006).

As parenthood as a phenomenon appeared holistic rather than a combination of carefully defined categories, it might be relevant to ask whether it is even necessary to define the tasks of parenting—or whether it is even possible. For example, Bradley names parental love as a part of the socio-emotional task of parenting. But can love, given the comprehensive nature of it, be even lumped together within one category or distinguish it from other categories (see also Bryant, Chadwick, & Kluwe, 2011)? Moreover, what parents do affects the child comprehensively and all the time, some actions more than others. In addition, parents' actions are connected with their previous and future action, and thus form a continuing and holistic process.

CONCLUSION

Parenthood is a challenging and wide research theme. In addition, it is extremely personal in nature. Research on parenthood has been criticized for its superficiality: studies cannot reach the profound nature of parenthood or causalities. Data collected within a short period of time cannot cover the whole essence of parenthood, and too excessive generalizations are being made (Aunola, 2005).

The fact that parenthood is personally experienced sets special conditions for research. Although various types of triangulation can be applied in research, the true diversity of data can be questioned. For example in this study, the parents who decided to participate in the research seemed to represent certain family types and professions. Most of the participants lived in nuclear families, were highly educated, and worked in the field of education. Their backgrounds can certainly be seen in the research. One can also ask whether the research theme was too sensitive for all parents or family types.

In addition, the results can be criticized for being too idealistic and far away from the actual everyday life. For example, the teacher's answers could represent merely a professional educator's opinions than the teacher's real opinion on the parents of the pupils in the classroom. What about parents? Did they answer truthfully or did they talk about ideal parenthood? The realization of parenthood was not studied in this research, and on the other hand, absolute parenthood cannot be figured out comprehensively. Maybe it is the children who answered the most openly and from the practical perspective.

In all despite the challenges of parenthood research, the purpose was to find out how the participants would describe parenthood when making them consciously discuss the phenomenon. Conscious parenthood helps parents evaluate and thus develop their parenting. This is because the awareness of the connection between one's mental states and emotional regulation and one's action forms the basis of mature and reflective parenting (Fonagy et al., 1991). "Reflective functioning refers to the capacity not only to recognize mental states, but to link mental states to behavior in meaningful and accurate", concludes Slades (2005, p. 275). In this study also, the purpose was to reflect upon parenting tasks from various points of view. By bringing out the perspective of multiple sides—the teacher, parents, and children—it is possible to show how differently parenthood can be seen and how widely parenting tasks expand. Most importantly, the study showed that parental love at the heart of parenting cannot necessarily be categorized under just one category of parenting tasks but merely we want to think it as the fundamental basis of parenthood. Uusiautti and Määttä (2011; see also Määttä & Uusiautti, 2013) have defined love as a combination of three areas: emotions, acts, and knowledge and skills. These three areas can be seen in reflective parenting as well. Not only is parenting a systematic performance of certain practical tasks but also a matter of creating the sense of being accepted and the sense of togetherness. Genuine care and concern over the child's feelings and doings teach the child emotional

regulation and that he or she is wanted and accepted as is. Parenting also requires certain love-based skills, such as interaction skills and continuity in making decisions and setting rules.

Our perspective considers parents as models of self-control, social skills, engagement in learning, and healthy lifestyles (Uusiautti, Määttä, & Määttä, 2013; see also Hubbs-Tait, 2008; Nijhof & Engels, 2007; Veríssimo et al., 2011), and providers of the sense of "worthy of love" in children (Lawrence, 2001). All this can be enhanced and materialized through parents' action which makes the study of parenting tasks relevant and called for.

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SAMPLE APPLICATIONS FROM MATERIAL DESIGNS PREPARED FOR VARIOUS PRIMARY SCHOOL CLASSES

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ABSTRACT

In the present study, the importance of using material in teaching at primary school is emphasized. Moreover, it is aimed to introduce teaching materials prepared for different classes by candidate teachers. For this reason, 18 students' designs from Primary School Teaching Division of Faculty of Education are presented. Candidate teachers who prepared those designs first choose their interested topics from different courses which they will give at primary school. It is emphasized that materials should be simple, clear, easy to use for the student, made from durable material, should make the topic more concrete, but that they shouldn't include too many details about the chosen topic. Designing materials can be considered as a part of learning experience by living and doing by candidate teachers. It is very important that candidates should design materials and that they should be encouraged to use them when they are doing their internship and later on in their professions. In this regard, "Instructional Technologies and Material Design" course, which has been given a single term four-credit course at Primary School Teaching Division, should be offered as a four-credit course in two terms. Furthermore, it might be suggested that current primary school teachers should be encouraged to develop and use materials and provided with practical applications by within-service seminars and that sharing of functional teaching materials should be provided.

Keywords: Material design, material design in primary school, candidate teachers.

INTRODUCTION

A teaching material can be defined as any kind of material designed to address different sense organs, contribute to the establishment of an effective learning environment and help ensure a higher-level learning (Yigit, 2007). According to Heinich, Molenda & Russell (1993: 4) "it refers to different methods and channels by which information can be communicated to learners." Examples of a teaching material include such boards as the Ataturk corner, season charts and history charts as well as atlases, globes, books and journals in the bookcase, computers, projections, overhead projectors and blackboards. A teaching material is of great use to teachers in that it makes target abstract information concrete. The involvement of different sense organs in the process of learning makes a given subject more attractive and learning more permanent (Arslan Cansever, 2013). Primary schools occupy a prominent place in the educational process. During the period, a child acquires basic information he/she will need to use throughout his/her life, including how to read, write and calculate (Aykac, 2012). A child that has reached the concrete operational stage, a stage specified by Piaget in his/her Cognitive Stages of Development, can comprehend concrete phenomena and events, understand reversibility and follow rules. Target information and skills specific to this stage can be provided for learners in an easy and time-saving manner through a teaching material that has been composed in accordance with design components. For a child in this stage, learning something in a concrete way is one of the prerequisites for permanent learning.

Unless learners are enabled to interact with teaching materials in favorable environments, their use will not yield to a reasonable return, nor will such learners become successful. In this regard, one of the most significant factors in effective use of teaching materials is their selection and preparation (Yigit, 2007). In fact, Sahin and Yildirim (2004), states that some effective teaching materials can reflect all the activities targeted by the teacher (attention-getting, information presentation, clues, participation, exercises and revision, providing feedback, correction and assessment). Rotter (2006), identified four underlying principles of the development of teaching materials. These are contrast, orientation, lettering and artwork. Contrast, enables important information to get recognized by the learner whereas orientation represents beginning-to-end order of materials. The latter is quite effective in facilitating the learner's understanding of the material. Lettering means that the teaching material should be written (e.g. worksheets) and is the principle that the material should be understandable.

Artwork is the principle that information presentation should be enriched with graphical displays and visuals. Ornstein and Lasley (2000) noted that educational materials should be designed in a decent way and used in a planned manner. The process of designing is comprised of certain stages. Yigit (2007) defined these stages as planning, implementation and assessment. Planning, in turn, consists of two steps, namely preliminary examination and contemplation. It is essential in preliminary examination that one should specify target cognitive, affective and kinetic objectives. Setting objectives is fundamental; in addition, it is effective in guiding material design. According to Howe and Jones (1998), it is necessary that objectives should be taken into account in material use. Preliminary examination contains one more step, learners' entry-level competence, in which students' characteristics (students with a high or low willingness to learn) are questioned. At this point, one has to take into account the characteristics specific to a particular age group. In contemplation, one takes a look into behaviors/attainments that are indicators of objectives in reference to the curriculum. Specific measuring instruments are prepared to measure the behaviors in question. It is very important that materials should not contain too many details; instead, they should be simple and understandable. As a matter of fact, Winn and Halliday (1982) stated that materials should be designed in a simple way, for human perception is selective and we can direct our attention only to a small part of the message owing to limited capacity brought about by previous experiences and emotions. Other considerations are designing the material in a way that will help to make the given subject concrete and suitable for use by learners. Furthermore, they should be portable, dismantable and durable. Sahin and Yildirim (2004) stressed that teaching materials to be used again and again should be durable, easily improvable and updateable. Another stage, as stated by Yigit (2007), is implementation. As its name suggests, it refers to the actual use of the materials designed. The last stage, assessment, seeks for an answer to three fundamental questions:

1- Do the methods to be used for behavioral attainments include the teaching material in question?
2- What is the extent to which the teaching material is appropriate for students' level of perception?
3- What is the extent to which the teaching material is accurate and usable?

In 1998, the Council of Higher Education (YOK) in Turkey and the World Bank launched a joint project on the development of national education and made certain amendments to the curriculum for teaching departments in an attempt to restructure faculties of education (Yalin, 2003, p.4). Instructional Technologies and Material Development was incorporated as a compulsory course into the curriculum for all teaching departments so as to provide prospective teachers with an opportunity to put what they have learned in theory into practice. The YOK (2003b, p.152) described the contents of the course as qualities of certain instructional technologies, their place and use in education, development of teaching materials (worksheets, transparencies, slides, videos, computer-based course materials, etc.) through instructional technologies, and an assessment of different materials. A student who has completed the course is expected to know and use certain instructional technologies. Moreover, they are expected to be able to develop new teaching materials or improve on existing ones for educational purposes. In other words, material design is part of learning by doing for prospective teachers. Prospective teachers are encouraged to develop teaching materials and use them during job shadowing and, particularly, in their professional life, which is quite important for satisfying their teaching needs (Arslan Cansever, 2013). The purpose of the present study is to emphasize the importance of material use in primary schools, describe the teaching materials developed by prospective teachers for different courses and age groups within the scope of the course Instructional Technologies and Material Development and explain which part(s) of class they can be used in.

SAMPLE APPLICATIONS

**Picture 1: The Fun Multiplication Table
(Course: Maths, Grade 4)**

The purpose of "the Fun Multiplication Table" is to make learning fun and permanent by strengthening students' memory through trial and error. The material is used in the assessment stage. One of the cables is made to touch the staple next to one of the multiplications. If the answer is correct, the lamp in the middle of the multiplication table turns on.

"The Greengrocer's Stall" has been designed to familiarize children with different fruits, enable them to develop the behavior of healthy nutrition, and teach them about certain concepts such as many-few, heavy-light and matching. When the objective is to familiarize students with different fruits and healthy nutrition, the teacher demonstrates and introduces the products and explains the benefits they offer. By making certain regulations, the teacher can explain whether there are many or few fruits in any group. Children can be asked to place them equally. The teacher can ask them to count the number of fruits or match the objects in an attempt to reinforce their perception of numbers. The teacher can even organize a drama in reference to the greengrocer's stall, thus fulfilling the principle of life-likeness.

**Picture 2: The Greengrocer's Stall
(Course: Life Sciences/Maths, Grade 1-2)**

**Picture 3: The Product Map
(Course: Social Sciences, Grade 4)**

The purpose of "the Product Map" is to visually present the products that are cultivated in Turkey, thus making learning permanent. It is used in the development stage so that children can have a concrete idea of the products grown in different parts of Turkey. The material addresses different sense organs, such as sight, touch, smell etc., and ensures that the subject, which is apparently rather abstract and memorization-based for a primary school student, is taught in an easy and permanent manner.

The primary purpose of "the Weather Forecast Umbrella" is to enable students to observe certain characteristics of events or creatures and read visual materials. The secondary objective is to enable students to comprehend weather events through games and have an idea of reading graphics. The material is hung on one of the walls in the classroom and the teacher asks students, in turns every day, to direct the arrow on the graphic to the section that represents the weather conditions of that day. Finally, children can be encouraged to talk about weather conditions.

**Picture 4: The Weather Forecast Umbrella
(Course: Life Sciences/Maths, Grade 1-2)**

**Picture 5: The Fruit Tree
(Course: Maths, Grade 1)**

"The Fruit Tree" has been designed in a way that will enable children to learn how to add and subtract numbers in a fun environment and to develop their operational, and therefore, cognitive skills. In the assessment stage, children are asked to make adding and subtracting operations using the fruits. An example question would be "Seeing that there are three apples on the tree, how many are left when one falls down?" Afterward, each operation is discussed and solved in open class. This is followed by different adding and subtracting operations.

"The Animal Masks" has been designed to unlock students' imagination and improve their self-expression skills. It can be used in a way that is accompanied by a drama fictionalized in accordance with any stage of class. Masks are ideal materials to turn learning into fun for primary school students.

**Picture 6: The Animal Masks
(Course: Life Sciences, Grade 1)**

**Picture 7: The Night and Day Board
(Course: Life Sciences, Grade 1-2)**

The purpose of "the Night and Day Board" is to enable students to comprehend the concepts of night and day by demonstrating them certain observable changes in the sky. In this way, students will hopefully gain the ability to tell, compare and contrast the characteristics of events or creatures. In the introduction stage, the teacher can ask students to comment on the changes they can observe in the sky while talking about night and day and show these changes on the material. After the subject has been taught, the material can be put in a corner as an in-class material.

The purpose of "the Season Puppets" is to make sure that students can learn about the subject seasons in a more entertaining and permanent way. While explaining seasonal characteristics, the teacher animates the puppets in the development stage. The seasons are explained in reference to changes that can be observed on the trees. Children are allowed to touch and use the material. These puppets can be used in the assessment stage, too. In that case, the teacher animates the puppets and address questions to children.

**Picture 8: The Season Puppets-
Summer and spring (Course: Life
Sciences, Grade 2)**
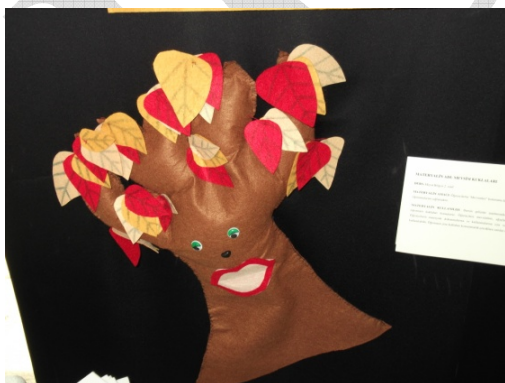
**Picture 9: The Season Puppets- Fall
(Course: Life Sciences, Grade 2**

**Picture 10: The Season Puppets- Winter
(Course: Life Sciences, Grade 2)**

Picture 11: The Season Chart
(Coures: Life Sciences, Grade 2)

The purpose of "the Season Chart" is to enable students to learn about the subject seasons by touching and seeing, and in a more permanent and easier manner. In the development stage, students are provided with information as to seasonal characteristics. During the process, students can be made to touch the material and comment on not only what they see but also what they feel. The material can also be used in the assessment stage, by making students either find the correct name of a season by studying the picture or explain seasonal changes. Finally, it can be placed on one of the walls as an in-class material.

Picture 12: The Word Top
(Course: Turkish Language, Grade 1)

Picture 13: The Word Top
(Course: Turkish Language, Grade 1)

The purpose of the materials entitled "the Word Top", for which two examples have been provided above, is to enable students to learn how to read and write in an easy and fun way. The material has been designed to enrich students' vocabulary and to contribute to their linguistic development, make their learning permanent, arouse their interest in reading and writing, teach words to them through games, and increase participation and involvement in the class. During reading and writing practices, students are made to twist the top and read out the word that the cursor points and write it down on the blackboard. In the meantime, the others copy the word into their notebooks.
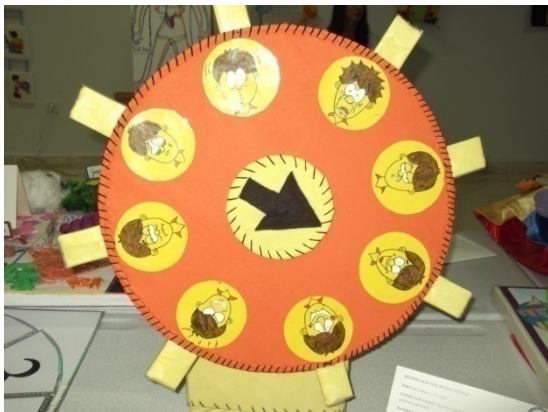
Picture 14: The Emotion Sun
(Course: Drama, Grade 1-2)

The purpose of "the Emotion Sun" is to enable students to understand certain emotions and develop their drama skills. The number of students to participate depends on the age group that one works with. A first grade student twists the Emotion Sun, picks up one of the expression cards and reads out what is written on it in the mood suggested. As for its application in grade two, two students are chosen. One of them twists the wheel and reads out the sentence whereas the other is expected to respond to the sentence. For instance, a child twists the wheel to find the emotion "surprised" and picks up a card to find the expression "I am sleepy". The first child reads out the sentence in any way he/she likes. The child the expression is addressed to responds in a "surprised" way. The second child builds up such sentences as "Gosh! You have just waken up, you have been sleeping for ages, etc." and suggest the emotion with relevant face expressions. The game, as well as the number of participants, can be modified depending on age group.

The purpose of "the Color Garden" is to enable primary school students to learn English equivalents of Turkish colors. The material has different color sections on it. In the assessment stage, the teacher reads out a color in English. What students have to do is to pick up the card with the name of the correct color and place it in the suitable color section. Alternatively, the teacher may read out a color in Turkish, demonstrate examples from the material and ask students to find the correct English equivalent. When the correct answer is elicited, the teacher reverses the card with the Turkish color and shows its English equivalent.

Picture 15: The Color Garden
(Course: English, Grade 4)
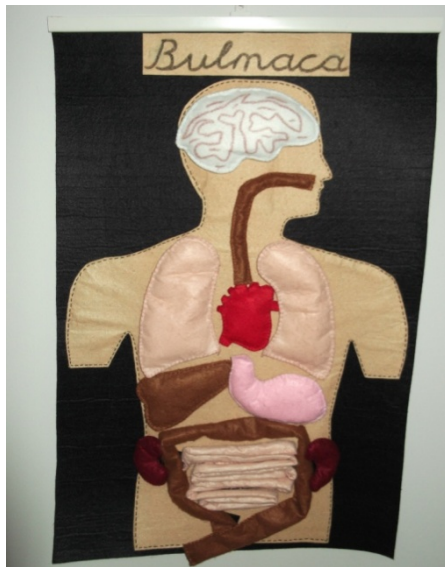
Picture 16: The Organ Puzzle
(Course: Life Sciences, Grade 2)

The purpose of "the Organ Puzzle" is to show the locations of our internal organs, an abstract subject, in a concrete way. The material helps develop students' ability to think, predict and associate. In the development stage, both the locations and functions of the organs are explained with the help of the material. In the assessment stage, when the lecturing is over, organs are extracted from the board and students are asked to place them again accurately. Since it has been designed to be quite durable, it can be used by many students.

"The Rotating Calendar" has been designed to enable students to learn the concepts of months and days and to enhance their knowledge of calendars. After these concepts have been covered, students are provided with an opportunity to practice with the rotating calendar in the development stage and they are made to find the date of that day. It can be hung on a wall decided jointly by students to be used as an in-class material. Students can rotate the calendar and learn about it by themselves and use it effectively every day by finding the correct date of each day.

Picture 17: The Rotating Calendar
Course: Maths, Grade 1
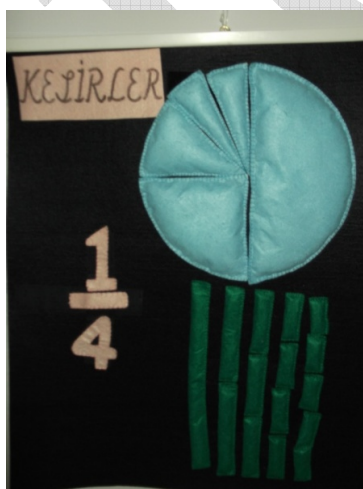
Picture 18: The Fraction Pies and Bars
(Course: Maths, Grade 3)

"The Fraction Pies and Bars" is intended to enable students to learn fractions in a concrete way and to develop the ability to think, predict and perform, thus making them more active during classes. The material is hung on one of the walls in the introduction stage. The subject fractions are covered in reference to the material. Afterward, one of the fraction pies or bars is placed on the board. Students are expected to calculate the value of the fraction and place it on the board. Since the material is attachable and detachable, it triggers students' sense of touch.

The purpose of the apron "I am drawing" is to help students use any paint in their drawings, to improve their drawing skills and to make them eager and willing to paint. In drawing class, the teacher puts on the apron "I am painting" and starts wandering in the classroom. Students pick up the paint they need out of the apron and use it in their drawings. Then, they are supposed to place the paints they have used on the apron again. In this way, each student is enabled to draw things in his/her favorite paint(s). It can also be hung on one of the walls and used as a permanent in-class material.

Picture 19: The apron "I am drawing"
Course: Drawing, Grade 1-4

DISCUSSION

Responsible for not only teaching certain skills and information to students but also directing their attitudes and behaviors once in office, prospective teachers need to have certain skills to perform these roles. In this respect, the first thing they need is an overall training. Such training provides them with general knowledge about their profession and roles and a personality that can perform these roles. Next, they should improve their competence in the contents and details of their subject matter. Third, they should be equipped with theoretical knowledge about educational sciences in general. Fourth, they need technical and practical skills. Finally, they should be able to synthesize and integrate all the qualities described in the first four dimensions for certain purposes in certain situations. A good teacher should not only be an expert in his/her subject matter but also know how to teach information and skills to his/her students. Teachers are enabled to gain these two qualities during their professional training (Aslan, Aslan & Arslan Cansever, 2012). A 21st-century teacher is expected to use technology in the educational environment, and to design and use those teaching materials that can integrate their professional knowledge with practice so that they can turn abstract information into something concrete. Instructional Technologies and Material Development is a course included in the curriculum for faculties of education with modern approach to teacher training and it is intended to help prospective teachers integrate technology with their classes. For prospective teachers, the course is part of learning by doing as well as being an opportunity for them to synthesize their personal abilities with professional knowledge and equipment. During their undergraduate education, it is very important that prospective teachers should develop materials and use them firstly during job shadowing and then in their professional life. In this way, they are encouraged to adopt the profession of teaching. All these considered, it is recommended that Instructional Technologies and Material Development, currently having four credits for students studying at the Department of Classroom Teaching in one single term, should be extended and covered two terms so that prospective teachers will have the chance to develop more materials. Moreover, it is recommended that those teachers already in the profession should be encouraged to develop and use materials and enabled to do practice through in-service trainings. It should also be made sure that functional teaching materials are shared.

The purpose of the limited number of teaching materials included in the present study is to turn what is invisible into visible, what is incomprehensible into comprehensible and what is abstract into concrete. Most importantly, prospective teachers should be encouraged to develop and use materials in both

their undergraduate education and professional life, and they should be promoted to share their materials with their colleagues.

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PROBLEMS FACED BY FEMALE TEACHERS AT PRIMARY LEVEL IN KHYBER PAKTUNKHWA PAKISTAN

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ABSTRACT
The schooling structure of Pakistan, in terms of quality education and knowledge having the lowest ranking position in the globe. Several reasons can be held to blame for this state of affairs.i.e the quality of learning and competency level of both students and teachers in Pakistan is among the poorest in the region. One of the reasons is the low level of educational qualifications required to become a primary school teacher. Another is the quality of teacher certification programs, which suffers from the lack of adequately trained trainers, little emphasis on teaching practice and non-existence of proper support/monitoring system for teachers. Teacher and its role is one of these rudiments. Because teacher is key part of the schooling and learning progression, which faces diverse tribulations owing to which they cannot play their roles efficiently in the education process. This ongoing text is based on a systematic analysis of the on hand text, decisively analyses the tribulations faced by female primary school teachers in the Khyber-Pakhtunkhwa Pakistan. Conclusion of this present on hand study reveals that teachers are not as much should be provoked towards teaching occupation, due to their appointments, transfers, place of posting and individual promotions, rapid rate of bribery and political affiliations and interference relatively than on merit. In many cases female teachers are appointed in inaccessible areas, where they not only faced with lodging and transport tribulations. The on hand study in additional establish that female teachers are overburdened with additional classes due to lack of teaching staff in primary schools, especially on one side female teachers face huge shortage of teaching and learning resources in schools and on the other side there are smaller amount proficient development opportunities for all teachers especially for female teachers. These few mentioned factors have very much affected the procedure of schooling and education in schools. The on hand study recommends that the problems of female teachers could be resolved to somehow by establishing an atmosphere of faith and intensification the system of answerability, on condition that schooling and education assets to female primary schools, providing ongoing proficient advancement opportunities and incentives to those devoted female teachers, making transparent appointments system and making clear promotions procedure just on merit, making arrangement for providing enough teaching and non teaching staff to female primary schools and rooting out the evil of political interference and involvement.
Keywords: Education, Problems of Female primary teachers**,** possible solutions, quality of schooling and learning

1 INTRODUCTION

It is tremendously imperative that girls have the same admittance to education in all disciplines. When girls are not educated, the foremost part of human resource is shattered. Their uneducated residents have little economic value inside and outside the home. Education is development and a key to success. Existing scientific and technological development can only be attributed to education (Bregman and Muhammad, 1998). The standard of education of a country intertwined and determines its position among other nations of the world. In this regard countries with high achievements in the fields of education and research lead the world. Education influences living standard as it turns the population of a country into useful human capital and works as an agent of positive change (Hoodbhoy, 1998). However, it is worth noting that teacher(s), as builders of the nation, holds a pivotal role in the process of education. In this sense the quality and standards of education are strongly associated with the quality and effectiveness of its teachers. Unfortunately in Pakistan very little attention has been paid to the education sector in general and the recruitment of quality teachers in particular. Resultantly, Pakistan has one of the lowest literacy rate and quality educations (Farooq, 1990). This study attempts to examine the problems faced by school teachers such as, academic, recruitment and promotion procedure, administrative and power structure, financial, training, curriculum, parental relations, and examination in Khyber-Pakhtunkhwa province of Pakistan.

2 Education in Pakistan: A extremely ignored and forgotten segment

Education in Pakistan, from the extremely start, has in no way remained a main concern for equally the military and civil elected governments. A dreadfully restricted sum of the GDP (little above 2%) has been billed to the education sector in Pakistan. As a result, Pakistan has the lowest literacy rate (Pakistan ranks 113th among 120 countries regarding literacy rate, which is projected to reach 60 percent till 2015 from the existing 55 percent and poor quality education compared to its neighboring countries, especially India i.e (India's 71 percent, while Bangladesh was estimated to have 61 percent literacy rate The education system of Pakistan, apart from the government negligence, eroded because of multilingualism, inconsistency and experimentation of the education policies and its stratified nature. Apparently the ramifications of this can be seen in the poor economic, political and social development of Pakistan. The system of government schooling does not respond satisfactorily to the needs of the society, because, it is considered to be poorly managed, poorly financed and poorly assessed. There are doubts upon the quality of schooling and learning in government schools from all quarters of the society (Government of Punjab, 2002). The circumstance does not look like to be improving. Many attempts were made by consecutive governments to lift up the quality of schooling and education to acceptable national and international standards. But it did not bring any encouraging results. This frightening situation indicated that the system of education is going towards a big collapse and failures (Ashraf, 1983). The system of education faces different problems. One of the critical factors which have affected the system is teacher. Although, research shows that teachers are the key to success of any education system. However, studies show that in Pakistan the problems of school teachers have multiplied with the passage of time which has exacerbated the largely system of education (Government of Pakistan, 1998). There is feeling of estrangement among the teaching community. Teaching profession is considering the mainly poorly paid, less profitable and unappealing profession (British Council, 1988). Being a terminal stage, it is the most crucial level of education of a child. Problems faced by teachers at this level dangerously affect the overall process of schooling and learning. As very small research in this area has been done, therefore, this ongoing study was launched to spot out the major problems faced by female government primary school teachers in Khyber-Pakhtunkhwa, Pakistan and to suggest possible solutions to these problems. In the underlines we shall discuss the problems faced by female government primary school teachers.

3 Problems of government female primary school teachers in Khyber-Pakhtunkhwa, Pakistan

3.1 Problems as a result of prevailing society

We are living in a society where every one of us like their daughters/women to be treated and taught by female nurse and teacher but intensively hate and dislike our women/girls/female to part in education or services hence the matter seems quite ambiguous

3.2 Problems as a result of economic conditions

Owing to getting a smaller amount of financial support, the side of education system has remained the most under paid and poor in performance especially in female. This fact has rendered the education sector as the most unattractive profession in the country. Teacher community, being the most finically poor in society, often look for other sources of earning such as going abroad for working and run their own businesses at the cost of their professional integrity (Zafar, 2003). In this regard teachers are less motivated towards and take least interest in their school duties. In many cases teachers get salaries without attending the schools because of their businesses. This has retarded the process of quality teaching and learning in schools (Shahzadi and Perveen, 2002).

3.3 Problems as a result of household activities

Sometimes due to huge family and laborious work the female teachers become so busy and involved that she does not pay full attention to school and teaching profession although govt has done much to uplift the miser and pity conditions of teachers but still much efforts and determination is required to overcome this problem (Riasat at,el,2005).

3.4 Problems as a result of Political interference

Education system of Pakistan now a day's very highly politicized. In common cases teachers are inducted on the basis of their political affiliations rather than on merit, who often serve as political workers instead of performing their professional duties. if a teacher has no political affiliation to any political party then it is very hard to maintain his present place and position Similarly due to political tie in the education sector, over and over again the established process of selection is despoiled. These politically chosen ineffectual teachers become a permanent burden on the economy and a cause of the fall down of the educational system (Shah, 2003). Further, their illegal promotions and politics in the schools get in the way the educational progress in terms of quality schooling and learning as well as expose the spirit of dexterity among the teaching society. It is also important to point out here that often teachers who do not pay attention to the dictations of the political actors are harshly punished in social or financial terms and sometimes transferred to far-flung areas especially hard for female teachers. This lack of professional freedom of female teachers has deficiently exaggerated the degree of success of their duties. They work with slightest curiosity and motivation (Saleem, 2002).

3.5 Problem as a result of social recognition

According to Rehman (2002) teaching is considered the most important and critical position in the entire education systems well as a deferential professions in all societies of the world. It is considered one of the main pillars of a society (Adams, 1998). In some countries teaching is taken as the most honorable and lucrative profession. In developed nations teachers are adored and occupy a reverential social position in society. However, in Pakistan teachers, particularly school teachers, in theory are exalted but the reality is the other way round. In Pakistan, teaching profession does not enjoy a great social status in the society. Teaching is considered the most underpaid and less attractive profession as compared to other professions like medical or engineering and so on. Malik (1991) discovered that in Pakistan the social status of teachers is accepted only at the extent of Holy Scripture. For example, ideologically teaching is deemed as the prophetic profession and teachers as the promoters of prophetic job. However, in practice this does not exist. Teachers stand at the last edge of the social ladder in society. This phenomenon has decreased the self-esteem of teachers. In these conditions the profession of teaching is the most little attractive field of service for the youth. Normally teaching is the last option in the priority list of different professions.

3.6 Problems as a result of lodging and amenities

Government does not give any housing lodging to female primary school teachers. Female Teachers posted in far-flung areas or outstations where they had to face the problem of lodging and protection. Especially female Teachers cannot have enough money to rent out houses on the money which is given to them and by a hair's breadth make their living. Due to non-availability of executive housing female teachers make extended absentees and are not capable to carry out their duties with complete concentration and happiness (Government of Punjab, 2004; Hussain, 2001).Accommodation is a major irritant in the sound family life of teachers. Due to absence of official accommodation, majority of the time of a teacher is spent in finding an accommodation. It has been observed that when finally a teacher finds an accommodation his next transfer is almost due. Due to which teacher greatly disturbed. It has been experimental that female teachers who are posted in far-off areas are more worried in return transfer

to their close stations from the time of transfer to the school. This practice depressingly affects the recital of the female teachers which leads to commotion and mental agonies.

3.7 Problems as a result of frequent transfers

Female Teachers in Pakistani schools are constantly at the sweet will of education officers and school administration. The transfers are usually made on the basis of favoritism and nepotism. Due to this practice most of the teachers remain in high mental agony, disturbance and pressures (Khan, 1980). Often transfers to remote areas are made to teach a lesson to the teachers who are either disobedient or have affiliation with opposing political party. Sometimes the newly transferred teachers do not find enough time to get adjusted to the new environment. The practice of frequent transfer of teachers creates not only disturbances for the female teachers itself but for their families, children but also affects the quality of schooling and learning in the girls schools (Farooq, 1993).

3.8 Problems as a result of professional development

 The success of any educational system depends on good and well-resourced teachers. Teachers cannot be replaced with any other kind of instructional material .Teaching is a profession which needs frequent updating. In this view female teachers should be alert of the new changes happening in the humanity and around the world. Likewise they need to be continuously abreast with latest theories, research and other addition to the pool of knowledge. It has been observed that female teachers who are not competently sound and upgraded are not able to handle with the diverse changes and variations in the society, country and the humanity at large. On the contrary female teachers who obtain latest knowledge and develop their skills can effectively manage the process of teaching and learning. They teach and learn better (Farooq, 1990).

Effective female teachers require being successful learners as well. Nevertheless, the professional development of female teachers has not been given any appropriate concentration in Pakistan. Resultantly, female teachers are establishing feeble in solving students' academic and societal harms. Additional, it is experimental that students graduating from the (government) schools have deprived communication skills and find it hard to contract with problems of life. As students in Pakistanis schools remember the concepts for examination rationale, they are short of investigative, deep and decisive skills like their teachers. This circumstance has exaggerated the generally degree of quality of education in the country (British Council, 1988).

3.9 Problems as a result of school culture

Relationship and coordination amongst female teachers and with their executive staff is vital for creating an atmosphere of reliance and efficacy. Be short of friendly relations affects the process of effective schooling and learning. The negative effects of politics in Pakistani schools have extremely exaggerated the cooperative guts amongst teaching community. In some cases principals or head teachers give favors to only those female teachers who admit their dictations without any hesitation and appraisal. Teachers who question them or ask for more support are deliberately overlooked and ignored. This perform has given birth to suspect and de-motivates some of the teachers who hate smooth talk. Normally school principals run schools like a kingdom, least encourage coordination among the staff, and have lack of vision (Government of Pakistan, 2001). In schools there is a culture of backbiting, slurring, tormenting, pleasing and leg pulling among the teaching community, often leads to skirmishes. The final effects of this fall on the students and quality of education. On the whole, due to this the procedure of quality of education in the schools is deeply affected (Khalid, 1998).

3. 10Problems as a result of community involvement

Teachers are not given due respect in their society that is why teaching profession is constantly losing its respect and qualified people join other professions. Only people having low caliber and ability join teaching profession .Schools are community in miniature. Teachers are important change agents, mentors and academic leaders of the society. In Pakistani, government, schools the concept of parental participation is very poor. Teachers normally face negative remarks form the parents' side as any (ill) performance of the students is related to the performance of the teachers only (Muhammad, 2002). Students who fail or show low marks in the examination, the teachers are held responsible for this without realizing that the performance of the students is associated with the role of school administration, parents and teachers. It is injustice to only hold teachers responsible for the bad results of the students in examination and so on. There is lack of awareness on the part of the parents and community that parents and community is equal stakeholder in the development of the student (Illahi, 1986).

3.11 Problem as a result of overloaded classes

According to Kahlid (1998) the out of reach working circumstances in Pakistani schools have added to teacher suffer exhaustion. There are no measures of work in some schools either due to the ignorance of the administration or laps on the part of female teachers to find out the procedure of work. In the mass of schools, mostly in far-flung areas, there is being short of female teaching staff. This overburdens other teachers in the schools. In view of Saleem (2002) this situation has increased more pressures on the teachers who become prone to physical discomforts. In this situation the teachers try to cover the syllabus at the cost of the quality in teaching and learning. Teachers cannot pay individual attention to many students which is a great psychological and social need of students.

3.12   The problems as a result of physical and learning resources

The lack of teaching and learning aids in schools creates difficulties in the teaching process especially for female. Some girls schools even do not have basic aids such as black boards, attendance registers, offices, libraries, laboratories and up-to-date books. Even the majority of girl's schools have lack of classrooms. In majority of girls schools there are no proper playgrounds for the physical development of students and teachers (Qureshi, 2002). This has created more monstrous problems for female teachers as they cannot provide the students wider opportunities for learning and development. Since teachers are expected to cover courses well in time, however, in the given conditions they fail to create meaningful learning environment in schools (Hussain, 2001).

3.13 Problems as a result of supervision

Rasheed, (2004) has found that there is a poor concept of supervision in Pakistani schools. The process of supervision is filled with bureaucratic underpinnings. In essence the purpose of supervision is to develop and improve the performance of teachers and students. Conversely, in Pakistan the process of supervision is characterized with the notion of inspection. Supervisors create an environment of fear during the process of supervision (Mohanty, 990). The supervisors behave like kings and treat the teachers like salves and inferiors.

This trend has created mistrust as well as affected the spirit of cooperation among the teachers on one hand and teachers and administration on the other. The supervisors instead of providing constructive feedback give orders to the teachers and hence no improvement takes place (Khan, 1998).

3.14 Problems as a result of coordination and cooperation

The system of education in Pakistan lacks a mechanism of coordination. This problem has taken rots due to weak communication between the policy makers, staff, parents and the community. The state of poor coordination in the system has promoted misunderstandings between the stakeholders (Farooq, 1993).

Teachers remain at the receiving end in all areas, e.g., in making of curriculum or any other education policy. Teachers participate only in the implementation not in the development part. This ends up in the creation of a culture of blame-game. There is even lack of coordination between teachers and principals (Zafar, 2003). This lack of coordination in view of Ashraf, (1983) has stopped discussion on different problems in schools as well as that of teachers. In this regard no effective measures can be taken to resolve vital issues at the school level.

3.15 Problems as a result of prevailing curriculum

Curriculum development in Pakistan is a centralized activity. Curriculum is developed and schools are supposed to implement it without any manipulation. In this regard teachers' role is that of implementer. They cannot contribute towards the process of curriculum development and evaluation neither they are provided with refresher courses to be in line with the updated syllabi (Hoodbhoy, 1998). This tradition has left the teachers ignorant of many aspects of the curriculum which ultimately affects not only their own performance but also the process of teaching and learning in schools. In many cases teachers are not aware of the aims or goals of the curriculum for certain levels. This creates gaps between understating of the curriculum and its effective implementation. However, in developed countries teachers are invited to participate in the process of curriculum design and development. Their inputs are considered vital for the right direction of the education system (Government of Pakistan, 2001).

3.16 Problems as a result of textbooks

Textbooks are a very important aspect of teaching and learning process (Farooq, 1993). Textbook development is highly specialized area in curriculum development. Female teachers in Pakistani girls' schools face problem of instruction due to non-availability of quality textbooks. There is a culture of multilingualism and medium of instructions in schools. This creates an environment of uncertainty, difficulty, fatigue and lack of understating both on the part of female teachers and students. Moreover, there is lack of training of female teachers on how to smooth the progress of or explain concepts from different textbooks (Hussain, 2001). This lack of orientation has created confusion among female teachers which reflects in their poor performances. Due to this female teachers as well as students are least interested in the process of learning. As teachers are expected to cover the syllabus before examination by all means, they, in order to overthrow the burden from their head and due to lack of understanding, resort to only reading and preaching the books without taking into account the vital aspects of schooling and learning such as development of various skills (communication, analysis, reflection) of students and enhancing their knowledge in an effective way (Khalid, 1998).

3.17 Problems as a result of delivery/pregnancy

All married woman has the common problems of pregnancy/delivery which female teachers face repeatedly during the entire service i.e on one side she has to performed his official duty and on the other side she faces a lot of complication and hurdles during this period, which is quite alarming one.

Findings and conclusions of the study

The purpose of this study was to explore the problems faced by female teachers at primary school level in Khyber-Pakhtunkhwa through a critical review of literature. The study fulfilled that overall system of education in Pakistan is affected by versatile issues, however, female teacher occupy a central role in this state of affairs. In this regard it was noted that there is lack of motivation among female teachers towards teaching profession due to smaller amount facilities in this career. Female teachers get fewer salaries as compared to other professionals in the country. Moreover, female teachers are frequently transferred from one place to another on the basis of preferential treatment and bias, thereby making them tormented and

gloomy. The study also concluded that there are no facilities of accommodation for female teachers posted in far-flung or outstations. Due to political intervention in the procedure of assortment, under qualified female teachers are appointed who cannot effectively manage the process of schooling and learning in schools.

The study also concluded that female teachers are overburdened with extra classes due to shortage of female staff in the girls' schools. Be short of resources in girls schools render the female teachers helpless while they need different aids for schooling and learning. There are no training facilities available to professionally update the female teachers to improve their teaching skills. The on hand study further explored that in girls schools, head master in most cases create master servant environment which makes the female teachers feel estranged from the system. Political groupings in female schools have defectively affected the bond between teachers and head teachers. This has also grimly exaggerated the procedure of quality of education in especially in girls' schools.

Recommendations of the study

Keeping in mind the findings of this ongoing study it is recommended that the problems of female teachers in Khyber-Pakhtunkhwa in particular and Pakistan in general should be tackled down through the following ways:

1. Atmosphere of reliance and intensification should be created, the system of liability in the school systems, the function and recital of the female teachers should be enhanced.
2. To maintain the attention of female teachers in the teaching occupation government should boost conveniences for female teachers, which will boost their enthusiasm plane. This will have a optimistic bang upon the by and large schooling and learning process.
3. For the enhancement of quality of schooling and learning the institutions are desirable to be provided with different schooling and learning assets. It will pick up the level of excellence of learning and schooling. For this reason additional cremation should be provided to girls schools to be used in purchasing of paraphernalia for schooling and learning aids.
4. Schools are considered necessary to be entirely at no cost from bribery and political affairs. For this reason, it is required to be ensured that political intervention should be minimized fairly out rooted from schools so that an environment of professionalism and trust is built.
5. Clean assortment on the basis of prerequisite ensures the selection of qualified people for teaching. Experienced people develop systems. Hence, it is suggested that at some point in the process of selection or appointments of female teachers merit should be strictly keep in mind.
6. The earth is full up with new-fangled changes and developments. Teachers manufacture professionals for the upcoming. Consequently, the female teachers necessitate being fully alongside each other with new information, study and most recent information in order to successfully coach and educate the kids for their upcoming roles. For this purpose, female teachers necessarily needed training on frequent basis. The teachers may be provided opportunities to participate in ongoing professional development programs to enhance teaching skills of teachers.
7. Female Teachers are the basic assets in the process of education. Female Teachers' involvement in the curriculum development will boost the degree of excellence of education in schools. For this reason, it is suggested that female teachers should be equally provided opportunities to involve yourself in the process of curriculum development.
8. In order to keep hold of the level of interest among female teachers, the allotment of classes should be simplified in schools by the principals or the higher establishment. To overcome this dilemma more female teachers should be provided to schools so that female teachers are not overburdened with additional classes and their energies are not pooped.

9. In order to work out the dilemma of course book, female teachers should be advised to transmit the knowledge to on daily basis experiences of their students. As a replacement for of teaching the book, female teachers should be advised to teach thoughts by using other sources such as the media, journals and so on. For this reason, school establishment should participate a imperative task. In this way female teachers will be able to handle with the uniformity of textbooks.

10. For successful schools efficient system of synchronization is necessary. Female Teachers should be communicated appropriately about the different developments taking place in the system of education like policies, programs and etc. In this way, the female teachers will develop a sagacity of care and feel to a team player rather than a fixing part in a system. This will boost their confidence and they will contribute in the process of schooling and learning ardently.

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FLOWERS OR FLOWERING PLANTS?: DETERMINING ALTERNATIVE FRAMEWORKS AND SOURCES OF THESE IN ELEMENTARY SCHOOL

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ABSTRACT
This study aimed to determine the alternative frameworks of elementary school 6th grade students (aged 12-13) regarding the *flower* organ (alternative frameworks) and sources of these alternative frameworks. A total of 158 students from 3 public schools in the province of Bursa participated in the study. In this descriptive and qualitative study 3 open-ended questions were asked, a drawing was made and 7 plant illustrations were used. As a conclusion, it was observed from the students' answers to the questions, the drawings and comments on the illustration that the most prominent alternative frameworks were those of using the flower, the reproductive organ of the plant, in place of the flowering plant, classifying it as a separate plant class and defining its reproductive function as helping reproduction, especially through its color and odor. It was determined that these alternative frameworks resulted more frequently from daily experiences and visual perceptions in real life, incorrect structuring of scientific knowledge given in the teaching environment and from cultural language.
Keywords: Science education, daily life, alternative frameworks, visual perception, flower concept

INTRODUCTION

Concepts in science education occupy an important place in understanding the complex structure of the environment and the constitution of a formal cognitive texture through pieces of obtained scientific knowledge complementing each other. Students construct their knowledge based on observations which they make starting from an early age and before starting school they acquire scientifically invalid information about some concepts as a result of their experiences (Barman Stein, McNair and Barman 2006). The acceptance of differences from scientific facts, although apparently consistent in itself and organized in a way to meet daily needs, and cognitive structures created in a scientific framework affected by various factors in an invalid manner, are defined as alternative frameworks (Gilbert and Watts 1983; Driver 1989; Palmer 1999; Seligin 2012). It is stated that *daily experiences (inferences made from observations, phenomena), teaching environment (scientific knowledge, course book, teacher strategy)* and *cultural factors (language, belief)* have effects on students' constructing their alternative concepts (Gilbert and Watts 1983,; Driver 1989; Science Teaching Reconsidered: A Handbook 1997, 28, Palmer 1999). Alternative frameworks arising from different sources are items of knowledge with no comprehensive scientific knowledge base but which can maintain their functionality in life and, if not removed, are likely to continue through further reinforcement in the following years. For students' existing knowledge to reach a level accepted as scientific is possible primarily through finding the sources of alternative frameworks and removing them and overcoming these resistance thresholds (Palmer, 1999; Harlen, 2001). Hence, it is necessary to make a considerable effort to achieve the correction of this kind of alternative framework and make correct associations. Such dilemmas are likely to be encountered primarily in learning life, and in later years at every stage of the teaching process (Treagust 1988, Driver 1989; Hewson and Hewson 1983, Hellden 2004; Lin 2004,).

In this study, the concept of *flower* as included in the science teaching program and which is also prominent, and observed in daily life is emphasized. Scientifically, the concept of *flower* essentially denotes some plant organisms, their essential reproductive structures including carpel and stamen and the parts including auxiliary structures which contain sepals and petals (Abercrombie et al 1974;

Marth and Hine 2008). In a broader sense, it is also possible to state that it is the reproductive organ of a group of plant species. The use of the word 'flower' with different meanings and definitions in domestic and foreign books and its having come to the fore in science lessons as a biological concept (Akman, 2008; Graham et al 2008) and the presence of incomprehensibilities, missing statements and even mis-statements in dictionaries in Turkish (Güncel Tükçe Sözlük 2012) and foreign languages (Thatcher et al., 1969:55) have helped these alternative frameworks to become rooted worldwide and have maintained and virtually fed these biology-based alternative frameworks as information-sourced.

In Turkey students learn about the parts of a plant in detail when they are 6th graders (aged 12-13) and inferences they have made both from their daily lives and observations until this time appear as a resistance to learning this concept. In the objectives and outcomes of the Ministry of National Education Program, it is emphasized that 6th grade elementary school students are supposed to know that the flower is the reproductive organ of the plant, how reproduction takes place in flowering plants and how fruit grows out of the flower. In the National Education Standards (1996:156), it is stated that the 5-8 years age group students may have some alternative frameworks in relation to the flower as a reproductive organ of the plant. Some studies have indicated that students, trainee elementary and biology teachers have some non-scientific alternative frameworks about the lifecycle of flowering plants, seed and fruit formation or the concept of the flower (Jewell, 2002; Hellden, 2004; Lin 2004; Barman et al., 2006; Gatt, Tunnicliffe,., Borg and Lautier., 2007; Yakışan, Selvi and Yürük, 2007; Mutlu and Özel, 2008; Topsakal and Oversby, 2011, Yürük, Selvi and Yakışan 2011). However, in both elementary and university level studies, there were not encountered alternative frameworks about the concept of flower as as an organ of flowering plants or sources of alternative frameworks In this study, it was aimed to determine alternative frameworks related to the *flower* organ in elementary students and the sources of these alternative frameworks.

Methodology of the Research

A total of 158 (73 female, 83 male and 2 anonymous) students from four elementary schools in the district of Osmangazi, Bursa, participated in the study.

In this descriptive, qualitative study, the participating students were asked 3 open-ended questions, a drawing was made and 7 plant illustration were used..

The open-ended questions were based on the data obtained from interviews held with 10 students who were selected using criteria such as success level, interest in nature and willingness to participate in the study within the framework of the objectives and desired outcomes of the Elementary Science Education 6th Grade Program. According to students answers, questions were reorganized and the data was collected by questionnaires. Three questions were asked to determine students alternative frameworks. First question was asked to determine alternative frameworks which results from their cultural environment, second question was determined to analyze visual alternative framewors which structured as a result of their observations and the last one was asked to determine alternative frameworks which based on teaching environment. The answers given to the questions were evaluated correct and incorrect. correct answers evaluated based on correct, partly correct and wrong explanation. To determine alternative frameworks, correct answers with wrong explanations and incorrect answers with wrong explanations were analyzed . Irrelevant explanations were not analyzed.

The students were asked to draw a flower and indicate its parts with the aim of revealing the students' alternative frameworks based on their perceptions about the concept of flower so it was not given

species names in particular The words which the students chose to name the parts when drawing a flower were evaluated in two main groups, namely those accepted as scientifically correct and those which were scientifically incorrect.

After questionnaires and asked to draw a flower, Some illustrations of plants were shown the students one by one and then asked to choose which ones were flowers, if there were any flowers in these illustrations.The illustration of plants were chosen according to their leaves and flower by with an expert specialized in this field. (*Philodendron bipimatifidium* was chosen because of its patterned leaves, *Gynura aurentiaca, Cryptanius bivittatus and Ember lace were* chosen because of their coloured leaves, *Heleborus sternii* and *Avena sativa was chosen* because of their green petals and *Justicia brandegeana* was chosen because of its coloured petals.) The choosen illustrations were classified as correct or incorrect.

Since the findings obtained from the research questions and the student drawings and the answers given to the illustration were examined again with an expert specialized in this field then the percentage and frequency values of the collected qualitative data were calculated.

Results

The question 1 "*Do all plants have flowers*?" was answered by 158 students. 140 students gave the correct answer "Yes, there is" but only 42.9% of the students gave an explanation (Table 1). 42.9% of the students gave a correct explanation such as "*Some plants are flowering and others are non-flowering, there are also non-flowering plants (*30.8%), *Plants are classified into two, namely flowering and non-flowering (5.5%), Some do not have flowers, they reproduce through spores (5.5%*), *Non-flowering plants reproduce through spores. Flowering plants such as rose, tulip, non-flowering plants such as fern and algae (1.1 %)* and 23.1% of the students gave a partly correct explanation such as *For example, phyrophytes or/and fern do not have flowers (19.8%), Flower is the reproductive organ in plants. However, non-flowering plants can reproduce as well (2.2%)*, *For example, a daisy has flowers but a fern does not (1,1%).*

Table 1: Distrubituation of the Answers Collected by Questionnaires

Answers	Explanations	Question 1	Question 2	Question 3
Correct answer		88.6% (n=140)	80.2 % (n=77)	71.9 % (n=82)
	Correct explanation	42.9% (n=39)	7.5% (n=6)	39.9% (n=33)
	Partly correct explanation	23.1% (n=21)	25.0% (n=20)	42.0% (n=49)
	Wrong explanation	28.6% (n=26)	55.0% (n=45)	-
İncorrect answers		11.4% (n=18)	19.8 % (n=19)	28, 1% (n=32)
	Wrong explanation	5.5% (n=5)	12.5% (n=10)	28.1% (n=32)

The answers of the 31 students who had alternative conceptions are shown Table 2. It was observed that the answers with incorrect explanation were given in a quite scattered, unrelated way, and the students' knowledge was not sufficiently supported even via information obtained from daily life such as "*Forbs and grass are non-flowering plants ,Cactus is a non-flowering plant;; all plants first come into flower and then become plant, It helps all plants grow fruit or smell pleasant*".

Table 2: Answers given to the question 1 "Do all plants have flowers? Please explain."

Answer	Explanation	Alternative frameworks	%
Correct	Wrong 28.6% (n=26)	*Forbs and grass are non-flowering plants*	6.6% (n=6)
		Plants have leaves or flowers	6.6% (n=6)
		Cactus is a non-flowering plant	5.5% (n=5)
		Flowers are divided into two	4.4% (n=4)
		It depends on if a male or female reproductive organ is present or not	3.3% (n=3)
		Trees are divided into two, namely flowering and non-flowering	2.2% (n=2)
Incorrect (Yes)	Wrong 5.5% (n=5)	*All plants first come into flower, then become plants*	2.2% (n=2)
		It helps all plants grow fruit or smell pleasant	1.1% (n=1)
		Flower is a plant	1.1% (n=1)
		All plants excluding cactus are flowering	1.1% (n=1)

The question 2 "*Is there a difference between a flower and a flowering plant?* was answered by 120 students but 96 answers were analyzed. 24 students did not give an answer. (Table1). 70 students gave the correct answer with an explanation but only 7.5% of the students gave a correct explanation such as *Flower is the reproductive organ of the plant; flowering plant is the one with flowers* (7.5%) and 25% of them gave a partly correct explanation such as *Flower is present in flowering plants /a part of them (7.5%), Flower is the plant's organ/part giving it beauty /odor. Flowering plant is the one with flowers* (6.2%), *The difference between them is that one is the flower and the other one is a flowering plant.* (6.2%), *Flower has an odor* (2.5%), *Flower is the reproductive part in the plant. A flowering plant has natural beauty* (1.2%), *It is a part of a flowering plant; its function is to attract insects to it* (1.2%).

62.5 % of the students wrong explanations are presented in Table 3. Explanations such as "*Flower itself is a plant, Flowering plant is a flower., Flowering plant is a flower, Since a flower is present in a flowering plant, it is not different, Flower is a plant which grows in nature by itself or we plant it.* indicate that they have alternative frameworks about the fact that a flower is a separate part of a plant and their explanations such as"*The difference between a flower and flowering plant comes from the color., Flower gives off odor, flowering plant produces fruit; Flowering plant is the plant with sepals and protecting flowers*.indicate that they have alternative frameworks about the reproductive function of a flower in a plant.

Table 3. Answers given to the question 2 "Is there a difference between a flower and flowering plant? Please explain."

Answer	Explanation	Alternative frameworks	%
Correct	Wrong 55.0% (n=45)	*Flower itself is a plant.*	10.0% (n=8)
		Flower gives off odor, flowering plant produces fruit.	7.5% (n=6)
		The difference between a flower and flowering plant comes from the color.	6.2% (n=5)
		Flowering plant has a flower on it.	5.0% (n=4)
		Unlike a flower, a flowering plant produces seed/fruit.	5.0% (n=4)
		Flower is the plant with different color and odor.	3.7% (n=3)
		Flowering plant is a flower.	3.7% (n=3)
		Daisy, violet, etc. is a flower.	2.5% (n=2)
		There is only flower, but there are many flowering plants.	2.5% (n=2)
		Flower is a landscaping plant.	1.2% (n=1)
		A flower stands alone with its leaves, but a flowering plant grows anywhere on a tree.	1.2% (n=1)
		Flower is a simple thing. Flowering plant is a plant.	1.2% (n=1)
		Flower itself is an organ. Flowering plant is present in a different plant.(1)	1.2% (n=1)
		Flower looks pleasant; flowering plant achieves pollination.	1.2% (n=1)

		The word flower brings to mind fragrance and color of petals but with the word, flowering plant, sepals surrounding petals come to mind. Flowering plant is the whole, but a flower is a part.	1.2% (n=1)
		A flower is the plant having only petals.	1.2% (n=1)
		Flower can exist both only by itself and as a part of a plant.	1.2% (n=1)
Incorrect (no difference)	Wrong 12.5% (n=10)	Since a flower is present in a flowering plant, it is not different.	5.0% (n=4)
		Flower means something which makes a plant look beautiful, gives a plant its color and gives off a pleasant odor.	5.0% (n=4)
		Flowering plant is the plant with sepals and protecting flowers.	1.2% (n=1)
		Flower is a plant which grows in nature by itself or we plant it.	1.2% (n=1)

The question 3 "*What is the function of the flower in a plant?* was answered by 116 students but 20 of them didn't analyzed. (Table 1). 42 students didn't give an answer. Correct answers were given by 39,9% of the students such as *It's the reproductive organ of the plant (*13.0%), *It achieves reproduction (*13.0%), *It achieves the plant's reproduction, pollination (*2.6%) and 42,9 % of the students gave a partly correct explanation such as *It gives the plant pleasant odor, beauty, color (*14.0%), *In addition to such functions as reproduction, pollination, fertilization, it has such functions as giving beauty and/or smelling pleasantly (*9.6%), *It is the reproductive organ and it has functions such as giving beauty and/or smelling pleasantly (*5.3%), *It yields fruits (*4.4%), *It achieves seed formation and dispersion (*3.5%), *It achieves formation of a new living being (*3.5%), *It achieves pollination (*1.8%), It produces pollen (*0.9%). Students described its function from an aesthetic point of view as especially "…*smelling pleasant, giving beauty (29.8 %), giving color (15.2%)*" and did not comprehend completely.

The distribution of wrong explanation given to this question is shown in Table 4. Explanations such as "*It gives off oxygen air, and provides respiration, It hotosynthesizes, It yields food, It achieves sexual and asexual reproduction in a plant*" indicate that students had difficulty in relating to pieces of scientific information obtained from learning environment and had alternative frameworks resulting from this situation

Table 4. Answers given to the Question "What is the function of the flower in a plant? Please explain."

Answer	Explanation	Alternative frameworks	%
Correct	Wrong	-	-
Incorrect 28.1% (n=32)	Wrong	It gives off oxygen, air, and provides respiration	7.0% (n=8)
		It photosynthesizes	5.3% (n=6)
		It has growth and development	5.3% (n=6)
		It yields food	3.5% (n=4)
		It is responsible for dispersing mineral substance and water	1.8% (n=2)
		A flower achieves reproduction of a flower	0.9% (n=1)
		It is the reproductive organ of the plant	0.9% (n=1)
		It achieves the reproduction of the plant in petals, sepals	0.9% (n=1)
		It reproduces and comes into flower	0.9% (n=1)
		It achieves sexual and asexual reproduction in a plant	0.9% (n=1)
		It landscapes the environment	0.9% (n=1)

The students' drawing analysis is presented in Table 5. In the naming of the parts of the flower, it was found that male organ (50.3%) and female organ (42.1%) comprising the actual reproductive structure were used less frequently than sepals (59.7%) and petals (56.6%) which comprise the auxiliary structures. Moreover, the parts of female and male organs were described less frequently. It was also observed that when labelling the parts of the flower organ, the students used the names "*root*" (16.4%) and "*stem*" (25.7%) thus integrating it with the plant. When the students' drawings were examined, it was determined that they had some visual and iconic alternative frameworks about the concept of

flower. It was determined that 37.2% (n=53) of the total drawings also included leaves and/or roots. This indicates that the students had alternative frameworks in discriminating the flower as an organ of the plant visually and showing its parts correctly

Table 5. Distribution of The Names Used by The Students in The Drawings

		%		%
Naming accepted as scientifically correct	Sepal	59. 7% (n=95)	Calyx	12.6 % (n=20)
	Petal	56. 6% (n=90)	Ovary	10.1% (n=16)
	Male organ	50. 3% (n=80)	Style	5.7% (n=9)
	Female organ	42. 1% (n=67)	Anther	4.4% (n=7)
	Peduncle	15. 7% (n=25)	Stigma	4.4% (n=7)
Naming not accepted as scientifically correct	Peduncle	25. 7% (n=41)	Mound	5.7% (n=9)
	Leaf	22. 6% (n=36	Seed	1.9% (n=3)
	Flower	18.2% (n=29)	Ovule	1.9% (n=3)
	Root	16. 4% (n=26)	Flower root	0.6% (n=1)
	Pollen	11.9% (n=19)	Stigma organ	0.6% (n=1)
	Female reproductive organ	3.8% (n=6)	Male reproduction cell	0.6% (n=1)
	Male reproductive organ	3.8% (n=6)	Male reproduction	0.6% (n=1)
	Leaf stalk	2.5% (n=4)	Female reproduction cell	0,6% (n=1)
	Ovule	2.5% (n=4)	Female reproduction	0.6% (n=1)
	Female	1.9% (n=3)	Reproductive pollen	0.6% (n=1)
	Male	1.9% (n=3)		

The students were shown various illustration of flowering plants and plants with colored leaves and for each one were asked if they saw a *flower*. The answers are given in Table 6. It was observed that the students were mistaken mostly about the colored-leafed Cryptanthus *bivittatus* (65.3%) and *Gynura aurentiaca* (59.4%). Students had difficulty recognizing the leaf-like flowers of *Avena sativa and Justica brandegeana* and gave incorrect answers at the rates of 53.0% and 8.4% respectively. Incorrect answers were given at a rate of 12.9% related to *Helleborus sternii* with green-colored flowers. The students had difficulty distinguishing the *flower* organ from a plant, when there were different types of petals. Moreover, the incorrect answers given by the students to the plant illustration of *Cryptanthus bivittatus (63.5%) and Gynura aurentiaca (59.4%) and Philodendron bipimatifidum (37.4%)* indicate that the students may have perceived the *flower* in plants with different shapes or colored leaves, not as an organ of the plant but as the plant itself. So it was found that they had some visual and iconic alternative frameworks about the concept of flower when there were different types of petals or shapes or colored leaves.

Table 6. Distribution of The Answers Given by The Students to The Plant İllustration

Names of the plants	Correct %	Incorrect answer %
Helloborus sternii	88 % (n=87.1)	12.9 % (n= 13)
Ember lace	65.3 % (n=66)	34.7 % (n= 35)
Philodendron bipimatifidum	62.4 % (n=63)	37.6 %(n=38)
Avena sativa	47.0 % (n=47)	**53.0 % (n= 53)**
Justicia brandegeana	41.6 % (n=42)	**58.4 % (n= 59)**
Gynura aurentiaca	40.6 % (n=41)	**59.4 % (n= 60)**
Cryptanthus bivittatus	34.7 % (n=35)	**65.3 % (n= 66)**

DISCUSSION

In this study, it was determined that the students had alternative frameworks related to the concept of *flower* and these alternative frameworks had resulted mostly from real life experiences, incorrect structuring of scientific knowledge given in school and cultural language.

Answers given to the open-ended question "*Do all plants have flowers? Please explain*" such as "*forbs and grass are non-flowering plants, plants are leafed or flowering, forbs and grass are non-flowering plants, trees are divided into flowering and non-flowering*" provided information about the children's knowledge which they structured as a result of their observations. It was also observed that the children sometimes made classifications by stating that "*grass has no flowers*", "*forbs and grass do not come into flower*", "*some plants are leafed or green, some are flowering ....*" and classified some plants whose flowers could not be observed as non-flowering plants. Barman et al. (2006) determined that students in K2, 3rd -8th grade students accepted the concept of *flower* as a plant and did not define *grass* as a plant since it did not have flowers. Chen and Ku (1999), in a study with aboriginal children, found that the students made a separate classification between flowers and grass. This finding indicates that the alternative frameworks of separately classifying the flower organ by integrating it with the plant in the classification of plants, which results from observation, is similar in different cultures. Hewson and Hewson (1983) stated that individuals may have preconceptions including different alternative frameworks as a result of their experiences, cultural and personal beliefs. They stated that when cultural differences exist, students from the same cultural group will have a wide range of alternative frameworks in their knowledge structures.

In the explanations given by the students to the question *"Is there a difference between the flower and the flowering plant?",* it was observed that the students used characteristics which they could observe in their daily lives such as *"The flower is the organ/part of the plant which gives it beauty/odor; The flower smells good; The flower emits odor; The flowering plant yields fruit; The flower is a plant with different color and odor; Daisies, violets, etc. are flowers; The flower is a landscaping plant".* In a study by Yakışan, Selvi and Yürük (2007), it was determined that approximately half of the students (46.9%) defined flowers as structures with colored leaves and giving off odor. Jewell (2002) observed that the students remembered the flower from an aesthetic point of view more permanently than from its reproductive function. Tunnicliffe (2001) observed in a study of 7-, 9- and 11-year-old children that when observing plants the children paid attention mostly to characteristics of plants such as color, shape and odor. Although students are taught especially the typical outer structures of plants in the early years of school, when classifying plants it is known that they firstly compare them with plant images that they construct in their heads and then classify them according to their appearance and physiological characteristics **(**Chen and Ku, 1999; Barman et al., 2006). However, it can be stated that such pieces of information as *"my flowers are my non-speaking beautiful children; flowers beautify nature with their beautiful appearance and odors"* included in the course books in their earlier education years might have had effects on the formation or supporting of these alternative frameworks (Life Sciences 3rd Grade Course Book, 2011:67, Science and Technology 5th Grade WorkBook, 2011:98).

That the rate of those answering the question *"What is the function of a flower in a plant? Please explain"* as *"it is the reproductive organ"* remained at the rate of 30.7% indicates that the flower is responsible for reproduction in a plant had not been understood. That the rate of those giving incomplete, incorrect answers was 69.3% indicates that educators had significant difficulty in teaching the concept of *flower.* Although some of the answers given by the students were correct, it was

observed that they were integrated with incomplete or internally inconsistent information and hence a new structuring was formed. It was also understood that some of incorrect answers were *information-sourced*. In this context, statements used by the students such as "*Flowers photosynthesize, breathe, give off food, are in charge of growing and developing plants and distributing minerals and water*" indicate that scientific knowledge obtained from the teaching environment with the aim of supporting the answers was used incorrectly. Incorrect structuring of scientific information given in the teaching environment by students was defined as causing conceptual misunderstanding (Science Teaching Reconsidered: A Handbook 1997, 28). This indicates that students had alternative frameworks resulting from this situation. In a study of classroom teachers, Mutlu and Özel (2008) determined that the students had alternative frameworks such as "*flowering plants reproduce through seeds*" related to the understanding of flower and fruit formation stages of a flowering plant. Palmer (1999) stated that the whole of students' information results from their daily life experiences. For example, it was stated that a student explaining that butterflies are in charge of pollination cannot have this understanding just based on observation without having knowledge of pollination (Eberbach and Crowley, 2009). For example, children observing shrimps will firstly notice their salient features and behaviors and record their colors and shapes as features. However, since these features vary according to the gender of the shrimps, they cannot notice differences between them.

Another alternative framework again appearing in the answers given to this question is the insistence on combining the function of *flower* in the plant with *"appearance"* and *"odor"*. A similar alternative framework is seen in the explanations which they made to describe the difference between the flower and the flowering plant.

It was observed that some students had difficulty in drawing and others in naming. It can be stated that the students had visual alternative frameworks related to showing the flower as an organ of the plant. Besides using scientific knowledge in describing the structure of the flower such as *sepal, petal, female organ and male organ*, the use of items of knowledge comprising the structure of the flowering plant such as *flower, peduncle, leaf* and *root* in naming the drawings supports such an alternative framework. Moreover, that the number of students writing the parts of female and male organs in detail was quite low indicates that the students remembered surface characteristics more. Topsakal and Obeyby (2011) determined that trainee teachers could not name the parts comprising the male and female organs and named parts including alternative frameworks such as root, peduncle, seed, pollen, etc. They also observed that the trainee teachers added the root and peduncle structures when drawing the structure of a flower and this indicates that alternative frameworks continue to exist at later ages. In a study by Stein and McNair (2002) it was reported that participating 5th grade and high school biology students used petals, the colored and attractive part of the plant, in naming their drawings at a high rate related to the anatomic structure of the plant. In addition, in their labeling, there was very little difference between elementary school and high school students. It was determined that 35.7% of the 4th graders and 36.5% of the high school students labeled the *"pistil"* in their drawings and 29.2% of the 5th graders and 42.6% of the high school students labeled the *"stamen"* in their drawings. Observations and examinations made in daily life differ from scientific observations. Students regard phenomena (facts) as a result of such observations which are not associated with scientific reasoning and explanations, and not as the acquisition of new information. For this reason, real observations take place based on scientific knowledge, but in daily observations many unrelated features, and behaviors which fail to set up or develop relationships are noticed (Eberbach and Crowley, 2009; Tunnicliffe, 2001).

When the answers given by the students to the illustration were evaluated, it was determined that they evaluated the illustration including plants with colored leaves but with no flowers (*Cryphtantus*

bivittatus and *Gynura aurentica*) as flowering plants. For the illustration of *Avena sativa* and *Justica brandegeana*, whose petals do not have vivid colors and are visually different from flower illustration included in course books, they gave the incorrect answer at a high rate although they had the flower organ, but for the plant of *Helloborus sternii*, whose petals are very similar to those in coursebooks but with no bright and vivid colors, they gave incorrect answers at a very low rate. This indicates that students name plants with colored leaves as *flowers* and perceive them not as an organ of a plant but as a plant itself. Here it is observed that visual perception and scientific knowledge cannot be integrated. Eberbach and Crowley (2009) stated that while some people pay attention to concrete and vivid details (iconic type), others pay attention to images providing spatial relationships (spatial type). In this study, it can be inferred from the answers given by the students that the students are iconic type. Tunnicliffe (2001) determined that the students paid more attention to the plants with salient colored flowers, fruits or shaped leaves in their observations. In a study conducted with 2-, 4- and 6-year-old children, Chen and Ku (1999) gave the children flashcards and asked them to choose those including plants. It was determined that although some of these illustration included typical root, peduncle and leaf structures, others did not, and the children chose trees, roses, forbs and vegetables as plants at a high rate. However, when interviews were held about these illustration, it was observed that the students could not describe the parts of these plants correctly; for example, they described the reproductive organ of liverwort as flower or root. In school learning, especially when direct observations are not made, visual elements commonly take place in science education as an important part of education material and if visual objects are related to students' existing knowledge, conceptual perception and ability, they may make a meaningful contribution to the objectives of education and contribute positively to expected learning with difficulty (Braga et al., 2012; 127, 128). Tosakal and Overby (2011) stated that students' inability to perceive visual materials used in teaching biology-contented topics completely may be the source of alternative frameworks about these matters.

In general, what was also observed in the answers given by the students to the questions was that alternative frameworks resulting from using a concept in daily life with a meaning different from the one used in physical sciences may hinder the learning of scientific knowledge (Yağbasan and Gülçiçek, 2003; Ford, 2005). When Ford (2005) asked elementary students to describe rocks and minerals, he observed that the students used everyday language in place of scientific descriptions. For example, when describing rocks, the students used everyday language such as "looks like a cliff", "shaped like a lemon cliff". Everyday language hindered understanding of the characteristics of the rocks. As in many scientific activities, in the activity related to describing rocks and minerals, everyday language penetrated slowly through being used in the activity and as it was used, it became a part of it and this limited the conceptual development. In that study, the words like "shiny" and "sparkly" slowly replaced the scientific word "luster". Again, in a study with various age groups, Link-Perez et al. (2010) showed the students various plant illustration and asked them to name the illustration and determined that they used scientific names by adding such parts as flower, root and peduncle when naming plants (e.g., *Hibiscus* flower) and students named the illustration by adding plant parts such as leaf and flower like *oak leaf, hisbiscus flower* in place of the specific names of plants (orchid,…) as organs of the plants (root, peduncle, flower).

It has been observed that this alternative framework resulting from everyday cultural language continues to exist via course books and also has an effect in the teaching environment. The course books from the Kindergarden education program to the 6th grade Science and Technology Teachers guide book were investigated, it was observed that in Turkey the use the concept of flower in place of the flowering plant was culturally supported by course books and continued to exist Both in students' books and teachers' books, similar alternative frameworks were determined in which some statements use the concept of *flower* in place of flowering plant with such as "Together with children, plant

flower seeds in an appropriate place (Kindergarden Education Program (36-48-month-old)2006:157), Can you grow *flowers* in a dark room?(Life sciences 3th grade works book 2011: 142), We should not pick *flowers* (Science and technology 4th grade course book 2011:211) and For examination, *flowers* should be selected such as poppy, buttercup, geranium, rose, all the parts of which can be seen easily (Science and Technology 6th grade teacher's guide book 2011: 42).

As a conclusion, in the current study, it was observed from the students' answers given to the questions, drawings and illustration that alternative frameworks such as using the flower, the reproductive organ of the plant, in place of the flowering plant, classifying it as a separate plant class and defining its reproductive function as helping reproduction, especially through its color and odor, were more prominent. We can state that these alternative frameworks resulted from the inability to integrate scientific knowledge learned at school with direct or indirect observations and the inability to structure knowledge. Eberbach and Crowley (2009) stated that while real observations are made based on scientific knowledge, everyday observations are based on noticing many unrelated features and behaviors failing to set up relations and, as a result of their daily observations, this leads students to regard phenomena (facts) as phenomena which are not associated with scientific reasoning and explanations and do not provide new information. Again, in Turkey, the common use of the concept of *flower* in place of the flowering plant appears as an alternative framework resulting from cultural language and the use of the scientific concept different from scientific terminology hinders learning of the concept of flower. It also contributes to the continuity of the presence of alternative frameworks in course books including incorrect information in educational settings.

Traces can be seen of the damage caused by the alternative frameworks regarding the concept of flower through violating inter-conceptual integrity and affecting meaningful learning. This indicates that the connection between the teacher, the students and knowledge has not yet been overcome through meaningful and permanent learning can be seen. Studying this topic included in the first part of the teaching program in the second semester when spring comes and flower reproduction takes place will remove the alternative frameworks encountered in the teaching of this topic. Moreover, a classroom environment in which teachers bring various kinds of flowers and plants with colored leaves and support students' observations through scientific knowledge and select visual materials suitable for topics will help them comprehend topics correctly and thus make teaching more effective.

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Kindergarden Education Program (36-48-month-old) ,2006

Life Sciences 3rd grade work book, 2011

Science and Technology 4th grade cours book, 2011

Science and Technology 5th grade teacher's quide book , 2011

Science and Technology 6th grade teacher's guide book, 2011

CONGRUENCY-SIMILARITY TEACHING THROUGH CREATIVE DRAMA IN MATHEMATICS TEACHING

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ABSTRACT
Geometric models and geometric samples take an important place in mathematics teaching (Sherard, 1981). In mathematics teaching, students gain permanent acquisitions thanks to discovering and generalizing by introducing geometric shapes and by making students grasp them. One of the main objectives of geometry teaching is to be able to explain geometric shapes' congruency and similarity by comparing them. Congruency and similarity of triangles is among the subjects which has been studied on since the beginning of geometry, it is as old as geometry itself (Baykul, 2009). Lots of teaching methods can be used in teaching the congruency and similarity situations of triangles. Students best learn this subject through exploration. Creative drama, one of the contemporary teaching methods, allows student to explore. Geometry teaching through creative drama, a teaching method, is the main focus of this study. In the study, creative drama practices were carried out aiming at two acquisitions pertaining to geometry learning area congruency and similarity sub learning area in 7th grade mathematics subject. In the study, the purpose is to put forward the applicability of creative drama in mathematics teaching. The study is a private case work and, workshop plan and an assessment form composed of 4 open-ended questions, which were developed by the researcher, were used as data collection tools. Descriptive analysis method was used in the analysis of the data. The practices were carried out with 41 students attending Samsun Gazi Primary School in the second term of 2012-2013 academic year. Within the scope of the practices, 21 students treated the subject via creative drama practices, while the other 20 students treated the subject via traditional method. In consequence of the application, it became apparent that the students in the creative drama group could better understand the processes of forming congruency and similar polygon, deriving polygon, forming a polygon similar to a polygon than the traditonal group. As a result, it was concluded that it is positive for the acquisitions pertaining to congruency and similarity sub learning area to be provided via creative drama.
Keywords: Creative Drama, Geometry Teaching, Mathematics Education, Mathematics Teaching.

1. INTRODUCTION

Today, one of the methods of learning-teaching and practise that starts from the unity of human and that aims simultaneously to improve the needs to know (wisdom), to hear (conscience and aesthetics) and to act (motion), which are common abilities of human, is "drama in education" (Akar Vural and Sommers, 2011; p.1). Educational studies of drama is gradually gaining wide currency as a teaching method in each step of formal training, mass education and during the lessons (San, 1991).

Creative drama is an activity that is improved by games in the course of education and thanks to its this property, it is the vital part of education (Üstündağ, 1994; quoted by Üstündağ, 2009; p.25). Its use as a method in educational programs in recent years attract attention (Üstündağ, 2009). Creative drama is state of actions, extemporisations and animations which the participants produce by relying on their own creative inventions, genuine thoughts and knowledge (San, 1998).

The fundamental objectives of the fields of drama and creative drama in education are to improve the fields of affective and psychomotor behaviours (Adıgüzel, 2013; p.53). Creative drama is a teaching method which can be used in many fields (Fulford et. al., 2001). Thanks to various animations in the process of education, including students in the daily life by placing them in the center is the basis of the method of creative drama. Permanent learnings occur in the process in which students actively take part and in which they use their sense organs.

Creative drama offers children the chance to explore themselves through the lives of fictional "others" in asafe space that enables mistakes to be made and learned from (Jindal-Sanpe et. al., 2011). Creative drama has an important place in the curriculums due to the traditional education's being insufficient and due to its putting individual in the center. Student's being active in the process of constructivist education is fundamental.

Field of geometry learning has a significant place in the elementary mathematics curriculum. It is required that various practices be included in the educational plans in order to enhance the success in geometry teaching (Swafford and others., 1997). It is necessary that students actively take part in the practices to be arranged in particular.

Geometric models and geometric samples have important roles in mathematics teaching (Sherard, 1981). To understand a mathematical definition, to make a hypothesis and to prove it, to visualize and to solve the problems are fundamental in mathematics teaching (Jones, Mooney and Harries, 2002). The fundamental of mathematics is to find a solution to the problems by understanding mathematics. It is necessary that in the solution of educational process, various teaching methods be included in the process. Geometry teaching through creative drama, which is a teaching method, forms the basis of this study.

2.Methods

Case study was used in the research. Case study allows one to determine what an event, a fact or individual's certain feature is and to make deep analysis (Gay, 2000). In this research, applicability of the method of creative drama in mathematics subject was examined in detail.

2.1.Study Group
The research was conducted with 42 students studying at 7th grade İlkadım Primary School in the second term in Samsun in the academic year of 2012-2013. Within the scope of implementation, 21 students were taught the subject through creative drama practices, while the other 21 students completed the process via traditional method.

2.2.Data Collection Tools
In the research, an evaluation form, which was arranged by the researcher and is made up of 4 open-ended questions, was used as data collection tool.
In the study, primarily interviews were carried out with the 7th grade mathematics teachers of primary school and the subjects which the students had difficulty in learning and understanding geometry were investigated. In consequence of the interviews carried out, it was determined that the students had difficulty in learning and understanding congruency and similarity. To that end, open-ended questions pertaining to congruency and similarity were arranged. 12 open-ended questions aiming at the subject of congruency and similarity were written. In the research, the evaluation of 4 open-ended questions were included.

At the end of the creative drama practices, the students were asked open-ended questions and the answers provided were analyzed. The research carried out is aiming at the applicability of creative drama and teaching of "congruency" and "similarity" in mathematics teaching. Before the creative drama practices, the open-ended questions arranged by the researcher were submitted to 5 persons who are experts on their branches and their approval that the questions are appropriate for the aim of the research were obtained.

2.3.Analysis of the Data
The method of descriptive analysis was employed in the analysis of the data. Descriptive analysis is an analysis that makes it possible for the research questions to be organized according to the themes they

produce, which allows for the quotations conspicuously reflecting the views of the individuals interviewed or observed, and which enables the findings obtained to be interpreted (Yıldırım and Şimşek, 2003).

In the study, creative drama practices were carried out aiming at the acquisition pertaining to congruency and similarity sub-learning field of geometry-learning field in the elementary education of 7th grade mathematics subject. The acquisitions are provided below.

1- The acquisitions determine whether the polygons are correspondent or not by comparing them and find correspondent polygons to a polygon.
2- The acquisitions determine whether the polygons are similar or not by comparing them and find similar polygons to a polygon.

At the end of the creative drama practices, an evaluation form of 4 open-ended questions were applied to all of the students. The qualitative data derived from the open-ended questions were encoded, and their percent and frequency values were obtained. Application of the workshop devoted to method of creative drama was conducted at four course hours.

3.Findings
The findings pertaining to the open-ended questions applied within scope of the research were presented below.

3.1.The Open-ended Questions Pertaining to Congruency and Similarity Learning Field and The Findings
The findings aiming at the four open-ended questions were included below. Each of the findings covers the tables including the students' expressions regarding creative drama and traditional teaching method.

Question-1. Draw a equilateral triangle on the dotted paper given below. Derive four equilateral triangles within the equilateral triangle you draw. Are there congruency and similarity in the triangles you derived? Explain.
The answers provided by the creative drama students are given in Table-1.

Table-1. Percentage-Frequency Distribution of Answres of Creative Drama Students

The Answers Pertaining to the State of Congruency and Similarity between the Triangles	Number of Students	Percentage Distribution
All the triangles are similar.	3	%14
The triangles are cookie-cutter.	3	%14
Congruences are at the same time similar, but similar ones are not congruences.	4	%19
The angles of big triangle and small triangle and their sizes are different.	5	%24
Those failing to form the shape.	6	%29
Total number of the students.	21	%100

Table-1 proves that the students participating in the creative drama practices know the congruency and similarity features in deriving polygon from equilateral triangle. In the creative drama practices, students made animations with tangram pieces. The answers the students provided are the terms they used in warm-ups and animations in the course of creative drama.
The table pertaining to the percentage-frequency distribution of the answers the students taught through traditional method provided for the first question is presented below.

Table-2. Percentage-Frequency Distribution of Answres of student group of traditional method

The Answers Pertaining to the State of Congruency and Similarity between the Triangles	Number of Students	Percentage Distribution
All the triangles are congruent and similar to each other.	5	%24
Cornet and edge numbers are equal to each other.	3	%14
Those failing to form the shape.	13	%62
Total number of the students.	21	%100

When the Table-2 is examined, the fact that at the end of the traditonal teaching method, 62% of the students failed to form the shape attracts the attention. It appears that the students listed only the features of congruence and similarity but failed to explain the state of congruence-similarity in the polygon.

Question-2. Draw a rectangle on the dotted paper given below, and draw polygons congruent to the rectangle you draw. Write the features of congruent polygons.
The answers the creative drama students gave are provided below.

Table-3. Percentage –Frequency Distributions of the Answers of Creative Drama Students

Forming Congruent Polygon	Number of Students	Percentage Distribution
They are congruent because they have same size.	6	%28
Similar polygons may be formed while forming congruent polygons.	4	%19
The proportion of congruent polygons to each other is 1.	2	%10
Their corners, edge numbers, shapes and angles are the same of each other.	5	%24
Those giving wrong answers.	4	%19
Total number of students	21	%100

Table-3 expresses the students' views on forming congruent polygons. It is understood from the percentage distribution that students correctly performed the drawing of a polygon congruent to a polygon.

The table pertaining to the percentage-frequency distribution of the answers the students taught via traditionsl teaching method is presented below.

Table-4. Percentage –Frequency Distributions of the Answers of Students Group of Traditional Method

Forming Congruent Polygon	Number of Students	Percentage Distribution
Polygon whose edge lengths and sizes are equal is formed.	7	%33
Polygon whose sizes of internal and exterior angles are equal to each other is formed.	2	%10
Those failing to form the shape.	12	%57
Total number of students.	21	%100

Table-4, it appears that the students failed to create (57%) congruent polygon in the course of the traditional teaching period. In addition, it was concluded that they could not answer the congruent and similarity features of the rectangle they drew but they listed their features pertaining their angles and

sizes. In the traditional method, the teacher used the school book. It was observed that the students had difficulty in the question about forming the congruent polygon.

Question-3. Draw a trapezium on the dotted paper given below. Create polygons similar to the trapezium you draw. Write the features of similar polygons.
The answers the creative drama students gave are provided in Table-5.

Table-5. Percentage –Frequency Distributions of the Answers of Student Group of Creative Drama

Deriving similar polygon	Number of students	Percentage Distribution
Polygons whose sizes and edge lengths and are different is formed.	7	%33
Dimensions of polygons are different.	6	%29
Their reciprocal edges are equally proportioned.	3	%14
Those giving wrong answers	5	%24
Total number of students.	21	%100

The above table shows that the students can form polygon similar to the trapezium drown. The student group of creative drama listed the different dimensions and features of the trapezium and clearly performed the drawings. Forming similar polygon and being able to list the features by using the trapezium reveal the efficiency of the teaching method provided.
The answers provided by the student group of traditional method are given in Table-6.

Table-6. Percentage-Frequency Distribution of Answres of Student Group of Traditional Method

Deriving Similar Polygon	Number of Students	Percentage Distribution
They were contracted at a certain rate.	7	%33
Its shape is same but its size is different.	4	%19
Those failing to form similar polygon.	10	%48
Total number of Students	21	%100

Table-6 shows that the students had difficulty (48%) in drawing trapezium. At the stage of deriving similar polygon, students' views that their shape is same but sizes are different (19%) and their expressions that they are contracted at a certain rate (33%) are positive. It becomes apparent that the students expressed limited number of opinions.

Question-4. Draw 3 triangles, which are similar to each other but at different positions, on the dotted paper given below. Draw polygons congruent to the triangles you draw.
The answers the creative drama students gave are provided below.

Table-7. Percentage –Frequency Distributions of the Answers of Creative Drama Students to the Fourth Question

Creating Polygon Congruent to a Polygon	Number of Students	Percentage Distribution
We use the same geometric shape.	4	%19
A geometric shape whose positions and shapes are different.	8	%38
Congruent polygon, whose dimensions are different only, is formed.	3	%14

Those giving wrong answer	6	%29
Total number of the students	21	%100

It becomes clear that the students participating in the creative drama practices are able to create a polygon congruent to a polygon. At the stage of forming polygon, Table-7, where the properties of using geometric shape (19%), position and shape (38%) and their dimensions (14%) were listed, is seen. However, it was determined that even though some of the students can draw triangles which are similar to each other but at different positions, they could not draw polygons congruent to these triangles.

The answers provided by the student group of traditional method are given in Table-8.

Table-8. Percentage-Frequency Distribution of the Answers of Student Group of Traditional Method to the Fourth Question

Creating Polygon Congruent to a Polygon	Number of Students	Percentage Distribution
Those drawing triangles only at different positions	10	%48
Those giving wrong answers	11	%52
Total number of the Students	21	%100

It is observed that 52% of the students, to whome traditional teaching was applied, made mistake in drawing triangle similar to each other but at different positions. It is seen in Table-8 that 48% of the students was able to draw triangles only similar to each other and at different positions, yet failing to create congruent poygon.

4.Result and Conclusion

As a result of the research, it was understood that the students in the creative drama group could learn the concepts of congruency and similarity between the triangles, could create congruent and similar polygons, could derive polygons and the stages of forming polugon similar to a polygon better than the traditional group students. As a result, it can be said that the fact that the acquirements pertaining to congruency and similarity sub-learning field is given through creative drama method is positive.

In the literature, there are a number of studies indicating similar results about the effectiveness of creative drama based instruction in the literature (Debreli, 2011; Duatepe, 2004; Duatepe ve Ubuz, 2004; Ersoy, 2013; Jeong Wee, 2009; Kariuki & Humphrey, 2006; Karakelle, 2009, Karapınarlı, 2007, Kayhan, 2004; Omnievski, 1999; Özsoy, 2003; Saab,1987; Sözer, 2006).These studies showedthe effectiveness of creative drama based instruction on understanding of mathematics lessons.

Saab (1987) states that while teaching mathematics, some elements of drama method such as individual's playing a part and employing music are used. Saab, in his research, employed the activities that will facilitate remembering and remaining in mind instead of dramatic set up to be included in a drama-based lesson. The research shows parallelism with our study.

Duatepe and Ubuz (2004), gave place to development and practice of lesson plans aiming at using creative drama in teaching and learning of geometry subjects in teaching drama-based geometry. With this lesson, it was concluded that the students explore the figure/shape which the dotes equidistant from a dot on the plane form, distinguish the area which the circle separated, compare the dotes given in the internal and external areas of a circle with the radius with their distances to the center and could link the circle with the ring (daire). In the study carried out too, it was significant to teach the subject of

geometry through creative drama workshop plan. Kayhan (2004) and Karapınarlı (2007), put forward that creative drama method in teaching mathematics has positive effects in the students' learning levels and retention levels. Jeong Wee (2009), focused on the fact that the practices conducted with the experts in field of creative drama increased the sense of responsibility, that the student is at the center of learning and that the leader of drama is important. In the research carried out too, the author is expert on the field of creative drama. The workshop plan written by the author in the research was prepared and applied by the author. Thus, the workshops conducted by the person expert on his field allow the process to be completed ideally.

Debreli (2011), put forward that the teaching based on creative drama is meaningful and stated that students show better performance, they actively participated in the lessons and it allowed for working in cooperation and for self-awareness. Creative drama has an important place in the education of students (Jindal-Sanpe et. al., 2011). In this research, the method of creative drama employed in mathematics teaching created a positive effect on the students. As the result of creative drama method, it became apparent that the concepts of congruency and similarity of triangles were better understood, and the stages of forming and deriving congruent and similar polygons actualized.

5.Suggestions

Karakelle (2009) points out that there is a substantial increase in the fluency and flexibility scores of the students participating in the process of creative drama. Students' creative thinking skills can also be tested in the practices of creative drama.

This research was arranged aiming at two acquisitions pertaining to geometry teaching field congruency and similarity sub-learning field, the applications aiming at other acquisitions can also be made. More outlasting creative drama studies can be made with the Elementary 7th grade students. The subject of creative drama can be included in the curriculum of the all levels of elementary education.

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MISCONCEPTIONS ABOUT PERIODICITY IN SECONDARY CHEMISTRY EDUCATION: THE CASE OF KAZAKHSTAN

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ABSTRACT

Determining students' misconceptions in chemistry is important for an effective teaching and learning chemistry. In this study we determine misconception about periodicity and help students to prevent developing erroneous ideas about periodicity. The sample of this study consists of 137 questionnaires who were secondary school's students and the test was developed after two step application on questionnaires. A questionnaire, including multiple choice and true-false format with 7 items was applied to total of 116 eight-year and nine-year secondary school's students who attended at gymnasium schools. The collected data was analyzed using data analysis technique in six categories (the meaning of periodicity, the determinative factors of periodic properties or periodicity, the relation between periodic properties and the number of subatomic particles, the meaning of period, periodic properties and the forms of periodic table). According to the all results, main reasons of erroneous ideas are the lack of teaching method that presenting only Mendeleev's periodic table (short form), no exercises about periodic properties and the meaning of periodicity cannot be focused as a subject during the teaching process.

Keywords: Teaching Secondary Chemistry, Misconception, Periodicity, Periodic Propertie.

Teaching of concept has great importance for an effective learning of chemistry. Nevertheless, it has some difficulty to determine students' misconceptions and learning meaningfully in secondary chemistry education. For this, the introduction of each new concept in education should be performed by connecting it with other concepts of different levels of generality (Sisovic & Bojovic, 2000); the concepts developed for organizing and arranging our knowledge (Beck, 1991); constructing new and more powerful meaning (Novak&Gowin,1984) are main ways of helping students for meaningful learning. Educational experiences of students as a result, if they not install the semantic relationship in the brain, the learning process is unable that an adequate level of understanding and some misconceptions or errorneous ideas occur in students' mind. Researchers has expressed the lack of students' understanding and perceptions in some terms; misunderstanding (Taber, 2001: Spada, 1994), misconception (Disessa & Sherin, 1998: Nakhleh, 1992: Pfundt, 1982: Herron, 1996), school-made misconceptions (Barke, 2009), conceptual misunderstandings, erroneous concepts and erroneous ideas. Many of misconceptions about chemistry subjects which are commonly taught in chemistry have been researched. One of these subjects is about periodicity and periodic system. Many studies have been done about instructional methods or techniques about periodic table or system and periodicity. Bolmgren (1995) simulate Mendeleev's development of the periodic table by organizing colored cardboard circles to increase level of understanding of students on periodicity. Goh and Chia (1989) used the learning cycle model used to teach the periodic table periodicity. This study indicates that students found card game a very interesting and meaningful and increased to understand their understanding levels of periodicity. Lehman et al. (1984) explored the effects of various structural modifications of the periodic table on learning. They used three different periodic tables in their study and proved to teach better using the modified tables than the traditional table on learning periodic system. Tejada and Palacios (1995) play a game which is Chemical Elements Bingo (CEB) to facilitate the learning-teaching process of periodicity in high school level. This game was designed to teach periodic classification and indicate that it was difficult to deduce properties with periodic classification for average student. Dreyfuss (2000) tried to teach elements in the periodic table with

very interesting technique that is likened an old car needs to paint to the periodic table. Knight (2003) use the pictorial periodic table and graphic technique of data mapping as inquiry-based methods to change high school chemistry students' understandings of the elements, structure, and periodicity of the Periodic table. Abraham et all (1992) researched about periodicity, learning periodicity and misconceptions on periodic law. They studied eighth-grade students' understanding of five chemistry concepts that chemical change, dissolution, conservation of atoms, periodicity, and phase change. They deduced the results of three questions: (a) what misconceptions do eighth grade students have concerning the chemistry concepts from their textbooks. (b) How is reasoning ability related to misconceptions concerning chemistry concepts? (c) How effective are textbooks in teaching an understanding of chemistry concepts? As a result, they indicated a general failure of textbooks as barrier to understand the five chemistry concepts and the nature of the misconceptions held by students teach a reasonable understanding of chemistry concepts. Although there is plenty of information on chemistry teaching in the international literature, there are few studies focused on determining errorneous ideas and students' misconceptions at all levels on concept of periodicity.

Method

The Purpose of the research

The aim of this study is to determine and categorize misconceptions or erroneous ideas and their causes in secondary chemistry teaching. This research has two steps; first step is related to misconceptions that occur during learning of periodic system in Kazakhstan. Second is to compare between findings of first step and misconceptions of the teaching in innovative way of modern periodic system.

The Universe and the Sample

This study is applied on secondary students who participate at gymnasium schools which are 175th and 113th gymnasium in Almaty region of Kazakhstan. Secondary education is given at vary type of schools, one of these schools are gymnasiums in the Kazakh educational system. Students attended gymnasium school have high level than normal secondary schools. The periodic law is taught first at age 14 year in Grades 8 at all schools of Kazakhstan. This topic is repeated to teach again shortly at age 15 year in Grade 9 in gymnasium school. The sample of this study consists of 137 questionnaires who were secondary school students and the test developed by the author. After pilot application on questionnaires, the test was developed with decreasing item number to 7 items and applied to total of 116 eight-year secondary school's students.

Instruments. Periodicity Conceptual Test (PCT) consisting of seven main items was developed in order to determine the misconceptions or erroneous ideas. These are related to periodicity and grouped in six categories (Table I). The PCT is a pencil reading test consisting three multiple–choice, three true/false and one open-ended test items. It is applied one hundred sixteen students who were participants of the main study. The reliability of PCT showed satisfactory internal consistency (Cronbach $\alpha = 0.76$). The difficulty indices of test is 0.31.

Data collection and analysis. PCT was applied to participants. PCT was administered in groups at the end of the unit of periodic law in chemistry course in eight class in accordance with standard curriculum. In PCT, the choices of each item were given as statement having ready knowledge as statements. The choices were scored as correct or incorrect response. If it is correct it equals 1 and incorrect equals 0 point. PCT was evaluated for both correct and incorrect responses for each student. Some misconceptions or errorous ideas were determined in accordance of the given responces of the each item. The students' answers were analyzed in six categories (the meaning of periodicity,

the determinative factors of periodic properties or periodicity, the relation between periodic properties and the number of subatomic particles, the meaning of period, periodic properties and the forms of periodic table). Frequencies and proportions of responses for each category were found. The relations of each category was shown.

Table I
Structure of Periodicity Conceptual Test (PCT)

Categories	Item number
1. Meaning of periodicity	2, 5
2. Determinative factors of periodic properties or periodicity	1, 4
3. Relation between periodic properties and the number of subatomic particles	3, 4
4. Meaning of period	3
5. Periodic properties	6
6. Forms of periodic table	7

Results and discussion

Periodicity is a difficult and abstract concept in which students have erroneous ideas. Fourteen misconceptions or erroneous ideas (Table 2) were identified through analysis of items on the PCT. These were categorized under the headings: the meaning of periodicity, the determinative factors of periodic properties or periodicity, the relation between periodic properties and the number of subatomic particles, the meaning of period, periodic properties and the forms of periodic table. These are discussed below in detail. In category first; There are two items which are "Why is the system of elements is called periodic?" and second one is "Note the following proposals, which help to understand the word "periodic"?". These two items are related to the meaning of periodicity as a concept. In accordance to first question two erroneous ideas which are "the relative atomic masses increase periodically and the atomic number increases periodically" are deduced (Table II). The true proposal should that the elements are listed in order of atomic number. Students have confused these two words; "orderly" and "periodically". In accordance to second question, 26.7 % of students choice the following proposal "The elements are arranged in accordance with the increase of the relative atomic mass in the periodic table" as an answer of understanding the meaning of "periodic". So, students think that "arrangement of elements by relative atomic mass" means periodic.

In second category; there are two items; first one is related to determinative factor of periodic properties. 54.3 % of students predict that if the numbers of energy level of atoms are the same, the property of elements similar to each other. However the number of energy level of electrons gives period number. Periodic properties are not similar over the periods exactly. Students believe that elements have similar chemical property in the same period of the periodic table. Trifonov (1971) predicted that 'it can be seen that the lengths of the rows (periods) in the periodic table are different and equal to 2,8,8,18,18 and 32. A mathematician would claim that there is no exact periodicity, since the period itself is not of constant value'. Thus, it is stressed on groups not only periods to understand periodic properties of elements. In accordance the next question "Which following factors change periodic properties?", 40.5 % of students answer as "When the total number of electron of an atom is changed, periodic properties don't change". This result shows that it is stressed on only atomic mass number to change the properties of an atom. Students can't know the effect of electron number or the number of other subatomic particles. They need to be taught electronic configuration effectively and how to relate periodic properties with electron configuration.

In third category; most of students erroneously (59.5 % and 66.4% of students) think that atomic number of an atom or proton number do not characterizes the chemical property of the element. We think that students place relative mass number instead of atomic number in their mind. The other

erroneous idea is "There are no elements arranged oppositely ascending relatively average atomic mass in short form of periodic table" that is shown by 62.9% of students. In short form of periodic table (Mendeleev's periodic table) there seemed to be irregularities in the increase of atomic mass from element to element. Most of the students incorrectly learn the difference between relative atomic mass number and atomic number. The meaning of relative atomic mass number should be taught with relating isotopes of elements. As we know that the greater the number of isotopes, the more average mass of an element. So the relative mass number is changeable but proton number or atomic number is characteristic.

Table II
Percentages of students' misconceptions or erroneous ideas (N=116)

Misconceptions or erroneous ideas	f	%
Meaning of periodicity		
Why the system of elements is called periodic? Because the relative atomic masses increase periodically	39	33.6
Why the system of elements is called periodic? Because the atomic number increases periodically	23	19.8
The elements in the periodic table are arranged in accordance with the increase of the relative atomic mass	31	26.7
Determinative factors of periodic properties or periodicity		
If the numbers of energy level of atoms are the same, the property of elements similar to each other	61	54.3
When the total number of electrons are changed in the atom, periodic properties do not change	57	40.5
Relation between periodic properties and the number of subatomic particles		
Atomic number of an atom do not characterizes the chemical property of the element	69	59.5
The number of protons an atom do not characterizes the chemical property of the element	77	66.4
There are no elements arranged oppositely ascending relatively average mass in short form of periodic table	73	62.9
Meaning of period		
Period is a series of elements arranged in increasing relative average atomic mass (decided by students as correct)	33	28.4
Period is a series of elements arranged in ascending order of atomic number (decided by students as incorrect)	49	42.2
Periodic properties		
Atomic radius of an atom is the periodic property of elements of an atom (decided as correct)	7	6
Ionization energy of an atom is the periodic property of elements of an atom (decided as correct)	15	12.9
Forms of periodic table		
There is no different form of periodic table	61	52.3
In the periodic table by increasing atomic number increases relatively average masses of the atoms	71	61.2

In category four; two erroneous ideas; 'Period is a series of elements arranged in increasing relative average atomic mass' decided correctly by the 28.4% of students as a first. The second was 'Period is a series of elements arranged in ascending order of atomic number' decided incorrectly by the 42.2 % of students. The both ideas were deduced as result of learning to be one way arrangement

of elements that is arrangement in increasing relative average atomic mass in periodic table. The modern periodic table should be shown and taught clearly difference the definitions of relative average atomic mass number and atomic number. In category five; the less students show atomic radius and ionization energy as periodic properties of an element. Only 6 % and 12.9 % of students answered that atomic radius and ionization energy of an atom are the periodic properties of elements respectively. As a reason, the periodic properties are not explained sufficiently during chemistry teaching process and there are no adequate exercises on chemistry textbooks. In category six; 61.2 % of students said the by increasing atomic number increases relatively average masses of the atoms in short form of periodic table. There are cases in which an element with a lower atomic number has a higher atomic weight than an element with a higher atomic number (see argon (Ar), and potassium (K)). Students confuse atomic number and relative mass number due to the short-form of table which is based on an increase relative atomic mass. The next erroneous idea was produced as an answer of question:"Is there another form of the periodic table, except Mendeleyev periodic table?" 52.3% of students believed that there is no different form of periodic table. The reason of this erroneous idea is the perception of students as only one way to arrange elements. It is need the correlation table to be better understanding the relationship between all categories except four. Category four is related to the meaning of period that causes to confuse with the meaning of periodicity. Thus, we thought no relation with each other. In accordance of Table III, we see there is no significant relationship between meaning of periodicity in which first category along with other categories. Nevertheless, it appears to be significant relationship between other categories. The relationship between second and third categories is positive that can be meant the proportion of learning determinative factors of periodic properties increases, students' knowledge about the relation the periodic properties and the number of subatomic particles are high. In addition, it is significant relationship between the categories 5, 6 and 2, 3 show that while students with the interests of understanding periodic table and periodic properties is positive, a progressive increase shows in learning of determinative factors of periodic properties and relation between number of subatomic particles and periodic properties. As a result, the relationship between all categories except first is proportional to the learning them but unable to understand by the meaning of periodicity.

Table III

Correlations between Categories (Pearson Correlation, N=116)

Categories	Category 1 Meaning Periodicity	Category 2 Determinative Factors of Periodic Properties	Category 3 Relation between Periodic Properties and Number of Subatomic Particles	Category 5 Periodic Properties	Category 6 Periodic Table
1 Meaning Periodicity	1.000	.177	.139	.149	.222
2 Determinative Factors of Periodic Properties	.177	1.000	.763**	.501**	.368**
3 Relation between Periodic Properties and Number of Subatomic Particles	.139	.763**	1.000	.389**	.316*
5 Periodic Properties	.149	.501**	.389**	1.000	.274*
6 Periodic Table	.222	.368**	.316*	.274*	1.000

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

Conclusions and implications for education

It was deduced that students have some misconceptions and erroneous ideas with the lack of instruction methods. As main reasons; using only one format of periodic table, no comparative exercises about periodic properties on table, inadequate expression of the concept of periodicity during the secondary chemistry education could be predicted. It should be considered in more depth on the description the periodicity in courses. We could foresee that students understand the meaning of periodicity while they learn the periodic system in traditional way. This indicates that the definition of periodicity should be placed apart on curriculum during the teaching process.

Teaching should be done in modern table efficiently and used different forms of periodic table. The concept of periodicity has objictified for better understanding the relations between elements. The meaning of periodicity should be focused as a subject during the teaching process and given examples about the periodic processes from nature. The some particular exercises on the modern periodic table like comparing properties of elements with each other and grouping elements in accordance of their properties should be taught that it helps student to learn better the concept of periodicity clearly. It should be concentrated on groups not only periods on periodic table while students learn the concept of periodicity.

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THE EFFECT OF PROBLEM POSING TASKS USED IN MATHEMATICS INSTRUCTION TO MATHEMATICS ACADEMIC ACHIEVEMENT AND ATTITUDES TOWARD MATHEMATICS

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ABSTRACT

The purpose of this research is to examine the effects of problem posing intervention on 8th grade students' mathematics achievement and attitudes toward mathematics. Word problems were used in the research as a tool to observe the differences between experimental and control groups. We analyzed the effects of problem posing instruction by specially designed tests on pre and post activities. Meanwhile we sought student responses through individual meetings.This study has been conducted with 8th grade students at a Kazakh High School for gifted students during the second semester of 2010-2011 academic years. There were 54 students in total that were divided into two groups. One of the groups was experimental and the other was control group. There was equal number of students in each group with a number of 27. The research took two months in the same school.The research used a mixed methods design with quantitative and qualitative components. Data from quantitative component that was pre and post test which were analyzed by using SPSS computer package. Qualitative design included data through which students were compared from pre to post intervention opinions. We used the Mathematics Achievement Test in order to measure the students' mathematics academic achievement. In order to measure students' attitudes toward mathematics, we used Mathematics Attitude Scale .The reliability of the tests were measured by special techniques and the value of Cronbach's Alpha constant was calculated as 0.83 for achievement test and 0.90 for attitude scale. During the problem posing instruction with experimental group students we used the activities that were specially designed word problems in the light of problem posing stages. Traditional educational methods were used in the control group. In addition, some questions were prepared for the students who got extreme scores from the activities. At the end of the research, data was evaluated by using paired sample t-test and the analyses of interview with students were conducted by using the descriptive methods.

Keywords: Problem posing, Mathematics academic achievement, Attitudes.

Educators and researchers are trying to find new methods in teaching and learning of mathematics education to improve and develop the students' problem solving abilities. Today many educators around the world agree that traditional methods of teaching and learning process cannot prepare individuals to the future. The aim of teaching mathematics is to develop cognitive abilities of children, logical thinking, self sufficiency and empowering the memory. Meanwhile to develop creative activities ; the ability to observe, compare, find similarities and differences; the ability to analyze, synthesize, generalize, abstract; the skills of mental arithmetic; the skills of proper and logical mathematical language. Generally, all curriculums about teaching and learning mathematics are agreed that the aim of teaching mathematics is to extend the students' ways of learning and to develop the students' abilities in problem solving and provide applicable mathematical knowledge, expertise and skills for future needs. Especially problem solving is accepted as the heart of mathematics education (NCTM, 2000). The students should understand their environment and world together and they should apply what they learn to real life. They have to use mathematical skills and mathematical knowledge in modern society. Otherwise students with traditional methods cannot solve the problems and cannot make relations between real life and their learning in rapidly changing world (MEB, 2011). Instead of teacher oriented, student oriented methods should be discussed. One of them is problem posing approach in math education. Problem posing is not independent from problem solving (Cai, J. Hwang,

S., 2002). There is a strong relationship between problem solving and problem posing as a cognitive process (Lowrie, T.A. 2002)**.** Brown and Walter (1993) suggested a new approach to problem posing and problem solving in mathematics teaching by using the "What If Not" (WIN) strategy. The strategy is based on the idea that modifying the attributes of a given problem could yield new and original problems that may gives very interesting results. In this approach, the students are encouraged to go through three levels starting with the examining the problem to generate new problems. At the first level, the students are asked to write the list of the problem attributes. And at the second level the students should ask many questions about the attributes related "What If Not" question and then suggest alternatives to the listed attributes. The last level of problem posing, they pose new questions by making more generalization.

Brown and Walter (2005) also stated that one of the important consequences of mathematics education is to provide opportunities to the students in mathematics lessons for developing their problem posing skills. Because problem posing is not only to generate new problems from given situations but also reformulate given problem and generalize for the solution. Problem posing has too much interest because of its effect in creativity and mathematical ability (Silver, E.A., 1994). Problem posing in contrast to traditional problem solving methods reduces anxiety and common fears about mathematics and increases positive attitudes toward mathematics (Philippou, G.N. Nicolaou, 2004). Problem posing improves not only students but also teachers' attitudes; alleviate misunderstanding about the nature of mathematics. Problem posing activities gives more responsibility to the students who are motivated for the problems during the mathematics class. Problem posing methods of learning bring up the students for the future as social an individual that meets the expectation of modern society.

Method

In this part, research model, participants, measurement instruments, kinds of application of research design, data gathering and evaluation of collected data were considered.

Research design of the study

In this research quantitative and qualitative methods were used. In quantitative research, problem posing instruction and traditional methods of instruction were independent variables and Achievement Test results, Mathematics Attitude Scale results are dependent variables. In this research, the effect of independent variables on dependents variables will be controlled that is why research was experimental study. The study used the matching only pre-tests post-tests control group design.

Table I
Research Design of the Present Study

Group	Pre-test	Treatment	Post-test
EG	M1, M2	PPI	M1, M2
CG	M1, M2	TM	M1, M2

In Table I, the abbreviations have the following meanings:

EG: Represent experimental group that received instruction with the "Problem Posing" (PPI)

CG: Represent the control group, which received instruction with the Traditional

Method (TM). M1: Mathematics Achievement test (MAT);   M2: Mathematics Attitude Scale (MAS);

The MAT, MAS were administered as pre-tests and post-tests.In experimental group problem posing

instruction was used while traditional teaching methods were used in control groups. In both groups, before instruction and after instruction Mathematics Achievement Test, Mathematics Attitude Scale was used as pre and post tests.

Subjects of the Study

The students who were participated to this study were from Kazakh high school. The number of the students who participated to the study was 54 students all of them from 8th grade. We divided the students into two groups as experimental and control according to Mathematics Equivalent Test results.. In qualitative part of the research, some students were selected to make interview conservation. Their opinions about problem posing were recorded in by video capture. The average value of the scores from the quizzes of problem posing activities determined the order of interview.

Steps of the Study

1- Before we begin the study, we apply a Mathematics Equivalent Test to divide the groups according to adjustment level. Their average results were compared and according to results, participants were divided into two groups as experimental and control groups.

2-The Mathematics Achievement Test (MAT), Mathematics Attitude Scale (MAS) were given to the students. The mathematics achievement test that includes word problems was prepared by experienced teachers and was controlled by experts. Mathematics Attitude scale was prepared as a reconfiguration of the Fennema Sherman and Aiken model of tests. There were four groups' questions. These are self confidence of esteem, value, enjoyment and motivation. Each part covered negative and positive type of questions.

3- The MAT, MAS were piloted with 128 students from 9th grade students at Kazak high school in Almaty. This pilot study allowed testing the reliability and validity of MAT. According to the results of this pilot study, the MAT was revised.

4- Activity sheets were prepared using appropriate problem posing statements as recommended by reports of research found in the literature. 5- Mathematics teachers administered the MAT to the students before and after the treatment during a mathematics lesson. The MAT test was applied to both groups before and after study. 6- The study ran into a period of seven weeks with 8 hours .The problem posing activities applied to the students 4 lessons per week.

Data collecting instruments

Data was collected in this research from the following instruments;

1. Mathematics Achievement Test: The test was prepared according to curriculum stated by Ministry of Education of Kazakhstan for 8 classes.. Factor analysis of the test and the questions was evaluated by SPSS computer program. And for each questions p (coefficient of difficulty index) and r (coefficient of differentiable index) were calculated by the equations

2. Mathematics Attitude Scale: Mathematics attitude scale was modified by Fennama and Sherman (Fennema E. And Sherman J. 1986)**.** The scale consists of four different types of questions that based on motivation, self esteem, value and enjoyment. There are 30 questions in the test which includes 10 questions from self esteem, 6 questions from value, 9 questions from enjoyment and 5 questions from motivation. Each part has positive and negative questions. There are 15 positive questions and 15 negative questions totally in the scale.

3. The reports of students in experimental group were about the problem posing method, as an application of method on word problems.

4. The video record of the students in experimental group.

Findings and Recommendations.

In this part the results of mathematics achievement test, mathematics attitudes scale were discussed. Meanwhile the writings and video presentations of the students about problem posing and will be evaluated. Recommendations of the students about problem posing in individual meetings will also be presented.　The averages and standard deviations of pre and post test shown in the table for experimental and control groups.

Table II

The sample paired t test results of Experimental and Control group students for Mathematics Achievement pre test

Pre -test results	N	X	Standard dv.	Standard er.	sd	t	p
Experimental G	27	11,33	3,94	0,75			
Control G	27	10,66	3,01	0,57	25	0,17	0,861

Table III

The sample paired t test results of Experimental and Control group students for Mathematics Achievement post test

Post-test Results	N	X	Standard dv.	Standard er.	sd	t	p
Experimental G	27	16,18	3,49	0,67			
Control G	27	10,66	3,01	0,57	26	2,92	0,007

In order to analyse the effect of problem posing instruction on students' academic achievement, the findings acquired in pre- and post application of the academic achievement test to the research and control groups were drawn in tables, and some comments were made in parallel to these findings. As it can be seen in the Table I, the arithmetic mean of the pre-test scores taken by the experimental group students was found 11,33 and the respected figure of the control group students was found 10,66. It is observed that there is a less point difference between group means and p value is more than 0.05. This indicates that there is no significant difference at the 0.05 confidence interval between the pre-test scores of the research group and control group students. By the fact that there is no significant difference between the pre-test scores of the experimental and control group students, the condition concerning the nearness of pre-knowledge level of the experimental and control groups before the research is fulfilled.

As it can be seen in the Table II, when post-test scores of the experimental group and control group students were examined, it was found that the arithmetic mean of the post-test scores taken by the experimental group students was 16,18 and the respected figure of the control group students was 10,66. It can be seen that there is more point difference between group means and p value (0,007) is less than 0.05. This indicates that there is a significant difference at the 0.05 confidence interval between the post-test scores of the research group and control group students on behalf of the former group.

Table IV

The sample paired t test results of Experimental and Control group students for Mathematics Attitude pre Scale

Pre -test results	N	X	Standard dv.	Standard er.	sd	t	p
Experimental G	27	3,36	0,4	0,078			
Control G	27	3,38	0,39	0,077	0,12	25	0,752

Table V

The sample paired t test results of Experimental and Control group students for Mathematics Attitude post Scale

Post-test Results	N	X	Standard dv.	Standard er.	sd	t	p
Experimental G	27	3,78	0,32	0,06			
Control G	27	3,41	0,39	0,07	26	0	0,006

As it can be seen in the Table III, the arithmetic mean of the Mathematics scale pre-attitude scores revealed by the experimental group students was found 3.36 and the respected figure for the control group students was found 3,38. There is no significant difference between the pre-attitude scores of the research group and control group at the 0.05 confidence interval. As it can be seen in the Table IV, the arithmetic mean of the post-attitude scores revealed by the research group students was found 3, 78 and the respected figure for the control group students was found 3, 41.In this respect, there is a significant difference between the post-attitude scores of the research group and control group at the 0.05 confidence interval on behalf of the former group. Namely, it is observed that there is a positive change in the attitudes of the experimental group students towards science class. In addition to the data obtained, the opinions expressed by the research group students at the end of the applications performed also mirror the positive change in their attitudes. Some of the opinions expressed by students from this group during the activities carried out in the research process are given below.

Student 1: I liked problem posing class very much. The posing activities were enjoyable and more interesting. The problem posing activities made us to like problems. Group works were also good as well. I was very contented with the applications.”

Student 2: “We were motivated more to study by writing the questions of problem posing that were fun and learning. In the problem posing method, it is so easy to produce questions and it is so good and fruitful to add our own ideas and discuss within group.”

Student 3: “The problem posing instruction attracted me to the participation to the class activities. It is a good method. We both learn and have fun. We started to like solving problems.

Student 4: “I overcome the fears and anxieties about mathematics problems in problem posing lessons. I understand subject matters better. The problems seem to be so easy.”

It can be said that there is no positive improvement in the control groups to which traditional teaching methods were applied. Yet, problem posing type of education employed in the experimental group brought about positive improvements in the conceptual development of the students. In the experimental group in which problem posing activities are applied, since students are in communication with their group members and other groups, they could find the opportunity to discuss and share their ideas. In this way, information transfer among students is accomplished. The examples given are chosen out of daily life and they are enriched by students.

Conclusion and Discussion

Problem posing method of instruction has significantly increased students' mathematical academic achievement. The students who have been experimental class had high positive attitudes toward mathematics.. In problem posing instruction, students were not motivated not only finding the correct answers of the problems but also the ways that they followed through the solution period of the questions. They were also more social when they tried to pose the problems. This was provided by interaction with the students as well as with teachers. The students had a chance to ask questions to teachers that is why they cancelled some misconceptions and they were directed right way during the problem posing stages.

The result of this present research indicated that contrary to traditional teaching methods, problem posing instruction produces significantly positive results in students' attitudes toward word problems and mathematics and mathematics achievement. Active involment and more participation gave the students more confidence and positive attitudes. Eggen (2003) showed that problem posing instruction emphasizes students' active involvement in learning. Thus, problem posing teaching frequently express that the students learn by connecting new knowledge to the real world.Our findings were similar with English (1997a) claimed that the activities of problem posing had a strong emphasis on children being creative, divergent, and flexible in their thinking and students were encouraged to look beyond the basic meanings of mathematics with those activities. Dewey (1986) stated that there is a strong relation between interest and effort that is increase in motivation because problem posing instruction is based mostly on students who start to be interested people. Interest and motivation by this way can be formed together; interest produces motivation and motivation produces interest. Problem posing increases motivation and optimism (Brown & Walter, 1983). If you combine these two statements, you can say that problem posing has a positive influence on self efficacy. Moreover problem posing reduces anxiety that is a negative factor on self efficacy beliefs. Problem posing which gives students more freedom and dialogue with the teachers provides a good development for self confidence. Kliman and Richards (1992) accepted that problem posing enlarges the inner control of the students. Inner control is an effective component of self attitude construction.

In conclusion problem posing instruction proposed new teaching methods in order to teach word problems in mathematics education. The results of the study also showed that traditional teaching methods can't give them to the students. Because traditional methods don't cover the attitudes of the students that were basically can't consider the psychological sides of the students. It may be just concentrated the mathematics achievement. Of course in both type of educational system the role of the teacher can't be neglected. In addition to all parts of problem posing we should not forget that the main aim is not to create the best problem posers instead of this we need to use problem posing as a tool to produce good problem solvers.

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THEORY OF MIND IN PRESCHOOL CHILDREN WITH NORMAL DEVELOPMENT, AUTISM AND MENTAL RETARDATION

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ABSTRACT

The present study was designed to evaluate the theory of mind in preschool children with normal development, autism or mental retardation in terms of the teachers' views on the mental ability, school adaptation, social and physical competences. Pre-school teachers (n=27) were requested to evaluate children with normal development (n=426), mental retardation (n=30) or autism (n=39) in their classes in terms of adequacy of mental ability, school adaptation, social competence and physical competence as well as school attendance while the results were compared with the theory of mind. It was found that there was a significant difference between the children who were found to be adequate or highly adequate in mental, physical, social and school adaptation by their teachers and those who were found to be inadequate or quite inadequate in theory of mind story tests in terms of qualitative and quantitative data.

Key words: *theory of mind; teachers' perspective; preschool children*

1. INTRODUCTION

Theory-of-mind (ToM) development is the area of cognitive development research that investigates the nature and development of our understanding of the mental world – the inner world inhabited by beliefs, desires, emotions, thoughts, perceptions, intentions, and other mental states. Since its introduction almost 30 years ago, it has grown to be one of the largest and liveliest areas in the developmental psychology.

Human social interactions are based, among other things, on the ability to detect cognitive and emotional processes in others (Frith & Frith, 2001). The development of theory of mind ability has been extensively studied in humans. Premack and Woodruff (1978) found that chimpanzees even have the ability to impute mental states and make inferences that can be used to make predictions about the behavior of other chimpanzees. The attribution of mental states, such as emotions, beliefs and intentions, to one self and to others has been defined as 'Theory of Mind' (Premack & Woodruff, 1978) or 'Mindreading' (Baron-Cohen, 1995). From an evolutionary perspective, theory of mind has been suggested to represent an essential component of social intelligence that evolved in primates to solve the problems of an increasingly complex social environment (Brothers, 1990; Whiten, 2008). Babies are born with, or acquire early, a number of abilities and propensities that will help them to learn about people. They find human faces, voices, and movements especially interesting. The capacity of children to recognize that other people have thoughts and desires that are not necessarily alike to their own thoughts and desires emerges during the second year of life (Onishi & Baillargeon, 2005).

In everyday life we form ideas about other people and about social situations. We interpret other people's actions and we predict what they will do under certain circumstances. Indeed, part of the intrigue in studying children's theory of mind is that it may constitute their first commonsense theory (Wellman, 1990). This makes ToM an essential skill for competent functioning and communication in everyday social situations (Astington & Jenkins, 1995). In brief, to have a theory of mind is to be able to reflect on the contents of one's own and other's minds. Difficulty in understanding other minds is a core cognitive feature of autism spectrum conditions. The theory of mind difficulties seems to be universal among such individuals (Baron-Cohen, 2001).

Research on ToM has travelled a long way in the last two and a half decades. Undoubtedly, the most important turning point in its history was the discovery that children with autism have impairments in understanding false beliefs (Baron-Cohen, Leslie, & Frith, 1985; Perner Leekam, 2008), a finding that changed people's thinking about the concept of ToM and had a profoundly positive impact on subsequent scientific progress in the field of autism. In the late 1980s, Uta Frith invited us to join her and Alan Leslie on their initial journey to explore the nature of the difficulty of ToM in children with autism (Perner, Frith, Leslie, & Leekam, 1989; Perner & Leekam, 2008).

The ToM Storybooks are a new instrument measuring basic ToM-functioning and associated aspects. There are 34 tasks, tapping various emotions, beliefs, desires and mental-physical distinctions. Four studies on the validity and reliability of the test are presented, in developing children (n=324, 3-12 years) and children with PDD-NOS (n=30). The ToM Storybooks have good psychometric qualities. A component analysis reveals five components corresponding with the underlying theoretical constructs. The internal consistency, test retest reliability, inter-rater reliability, construct validity and convergent validity are good. The ToM Storybooks can be used in research as well as in clinical settings (Blijd-Hoogewys, Geert, Serra, & Minderaa, 2008).

ToM is an issue that received much interest in the recent years and is of major importance for developmental psychology. Another interesting point is that, in autistic people, impairments in performance on the classic false-belief tasks have been detected (Leekam & Perner, 1991), but not on a ToM story books test.

Young children often provided psychological explanations considering emotions, thoughts and intentions, but did so appropriately. Specifically, nearly 100% of children's explanations for intended actions were psychological explanations, even for 3-year-olds. Moreover, 88% of 3-year-olds' explanations and 93% of 4-year-olds explanations for mistaken actions were also psychological explanations. In contrast, preschoolers provided physical or biological explanations for physically-caused or biologically-caused human movements (Inagaki & Hatano, 2006; Wellman & Lagattuta, 2004). Besides, preschool children were also shown to provide psychological explanations for voluntary, but not involuntary, behavior (Wellman & Lagattuta, 2004).

Children, on average, develop foundational ToM understanding by 4 years of age, though an understanding of more complex concepts (e.g., consciousness, forgetting, and attention) develops later (Flavell, Green, Flavell, & Lin, 1999).

Defining emotional competence requires acknowledging the intertwinement with social competence. Emotions are often understood as social processes (Salovey, 2003). Emotion is the primary medium of communication in infancy, and children's emotions are directly linked to their relations with others (Begeer, Koot, Rieffe, Meerum, & Stegge, 2008; Dunn, 2003). Throughout the lifespan, most emotional experiences and responses are contextually anchored in social relationships, and emotions become meaningful in interactions with other people (Begeer et al., 2008; Ekman, 1992; Frijda, 1986; Saarni, 1999).

Considering development as a whole, inadequacy in any of the developmental areas is believed to have a negative impact on self-perception and the interpretation of other people by the individual.
The present study was designed to evaluate the theory of mind in preschool children with normal development, autism or mental retardation in terms of the teachers' views on the mental ability, school adaptation, social and physical competences.

2. MATERIALS AND METHODS

2.1. Participants

With the permission of the Ministry of National Education, a total of 27 preschool teachers were included in the present study based on their voluntary participation. Teachers were then requested to evaluate the children in their classes in terms of mental ability, school adaptation, social and physical competences, and the results were compared with ToM. The sampling of the study consisted of total of 426 (45.8% were 6 years old, 51.6% were male) children with normal development enrolled in the preschool educational institutions of the Ministry of National Education in Istanbul. The first sampling group of the study was selected from the Uskudar, Umraniye, Kadikoy, Atasehir, Beyoglu, Fatih and Sisli districts of the Istanbul province.

The second sampling group included children with mental retardation (n=30; 56.7% were 8 years old, 76.7% were male) and autism (n=39; 38.5% were 8 years old, 87.2% were male) who were enrolled in rehabilitation centers located on the Anatolian and European sides of Istanbul. The autistic children enrolled in the study were those that were diagnosed with autism at a general hospital, were referred to a psychological counseling-guidance center, and were identified by their teachers as having "expressive language" and "experience transfer" skills (For example, teachers were asked to identify the children who could give correct answers to questions such as what they just did or what they do during the day, and who could make, even if short-term, meaningful conversations).

2.2. Procedures

Based on development reports prepared with two-month intervals, preschool teachers were asked to fill in a personal information form inquiring about their views on mental ability, school adaptation, the social and physical competence of the children as well as demographic characteristics of children (age and sex) and the school attendance.

2.2.1. A test on Theory of Mind – The ToM Storybooks

The ToM Storybooks is a Dutch psychological test performed to obtain information on the quality of a child's ToM skills, and to assess whether these skills have developed in accordance with the child's age or not (Serra, Loth, van Geert, Hurkens, & Minderaa, 2002). The test consists of six storybooks in which a main protagonist, named Sam, experiences all kinds of feelings, desires and thoughts. The child is asked a variety of questions about the protagonist's experiences. The questions are clustered in tasks. The tasks focus on ToM and associated aspects that children develop between the ages of three to six years old. They cover five components: 1) Recognition of emotion, 2) Distinction between physical and mental entities, 3) Understanding that seeing leads to knowing, 4) Prediction of behaviors and emotions from desires, and 5) Prediction of behaviors and emotions from beliefs (Blijd-Hoogewys, van Geert, Serra, & Minderaa, 2008).

In each story, the child is presented with an illustrated book that makes it easier to follow the stories read by the researcher. During the storytelling, researcher gives breaks to ask the child questions such as "Where will Sam look for grandpa?" and "Why is Sam looking under the table?". Giving the correct answer requires the child to take the perspective of the protagonist. Occasionally the child is also asked to connect the main character's mood to some additional pictures that represent different emotions like happiness, anger, sadness and neutrality. To administer the test, researcher needs six storybooks, an empty score form and emotion cards. Based upon the six books, a total score is calculated. Subsequently a quantitative (max 76) and a quantitative + qualitative score (max 112) are possible. In order to enable the standardized evaluation of the justifications, a category system has been developed, based on the category system used by Rieffe (1998), on different categories from

Wellman (1990), and on an exploration of the empirical data. Two rules of thumb are followed in scoring the justifications. First, a justification can only be scored if the preceding test question is answered correctly. Second, the correctness of categories varies over the different types of questions (Cheung, 2010).

For the Dutch version, a ToM quotient (ToM-Q) and a ToM age equivalent can also be calculated (Blijd-Hoogewys et al. 2008). ToM-Q is a normed quotient score with an average of 100 and a standard deviation of 15. Scoring the qualitative answers requires the researcher to be familiar with 21 different answer categories. In the current research, the ToM Storybook in Serra et al.'s study (2002) was used after it was translated into Turkish and its validation (Sari, 2011) was established.

2.3. Statistical analysis

Statistical analysis was made using SPSS software (Version 13.0, SPSS Inc. Chicago, IL, USA). The theory of mind with respect to mental ability, school adaptation, social and physical competences was analyzed using ANOVA test and complementary Post hoc analysis. The relationship between school attendance and the theory of mind was evaluated via correlation and regression analyses. Data were expressed as "mean (standard deviation; SD)", minimum-maximum and percent (%) where appropriate. $p < 0.05$ was considered statistically significant.

3. RESULTS

3.1. Demographic characteristics

Table 1 presents the demographic characteristics of the participants. Of the children with normal development, 201 (45.8%) were 6 years old, 220 (51.3%) were male, 286 (65.3%) had been attending the classes for 0-6 months. Of the children with autism, 15 (38.5%) were 8 years old, 34 (87.2%) were male and 36 (92.3%) had been attending the classes for 0-6 months. Of the children with mental retardation, 17 (56.7%) were 8 years old, 23 (76.7%) were male and 28 (96.6%) had been attending the classes for 0-6 months.

Table 1. Data on demographic characteristics and school attendance in children with normal development, mental retardation or autism

	Normal development		Autism		Mental Retardation	
	N	%	N	%	N	%
Age range						
Age 4	22	5.0	3	7.7	2	6.7
Age 4.5	50	11.4	4	10.3	0	0.0
Age 5	69	15.7	6	15.4	1	3.3
Age 5.5	86	19.6	3	7.7	3	10.0
Age 6	201	45.8	3	7.7	5	16.7
Age 6.5	-	-	5	12.8	2	6.7
Age 8	-	-	15	38.5	17	56.7
Gender						
Male	220	51.3	34	87.2	23	76.7
Female	206	48.7	5	12.8	7	23.3
School attendance						
0-6 months	286	65.3	36	92.3	28	96.6
7-12 months	143	32.6	2	5.1	0	0.0
≥13 months	9	2.1	1	2.6	1	3.4

3.2. Teachers' view on the adequacy of mental ability, school adaptation, social competence and physical competence in children with normal development, autism or mental retardation

Of the children with normal development, 190 (43.3%) were determined to be adequate while 207 (47.2%) were highly adequate in terms of mental ability according to teachers (Table 2).

Table 2. Distribution of teachers' views on adequacy of mental ability, school adaptation, social competence and physical competence according to groups

Teachers' views	Normal development		Autism		Mental Retardation	
	N	%	N	%	N	%
Mental ability						
Quite Inadequate	1	0.2	6	15.4	7	23.3
Slightly Adequate	41	9.3	14	35.9	19	63.3
Adequate	190	43.3	14	35.9	1	3.3
Highly Adequate	207	47.2	5	12.8	3	10.0
Quite Inadequate	6	1.4	9	23.1	3	10.0
School adaptation						
Slightly Adequate	31	7.1	11	28.2	10	33.3
Adequate	204	46.5	17	43.6	15	50.0
Highly Adequate	198	45.1	2	5.1	2	6.7
Quite Inadequate	6	1.4	11	28.2	6	20.0
Social competence						
Slightly Adequate	56	12.8	19	48.7	15	50.0
Adequate	203	46.2	9	23.1	7	23.3
Highly Adequate	174	39.6	0	0.0	2	6.7
Quite Inadequate	1	0.2	6	15.4	3	10.0
Physical Competence						
Slightly Adequate	22	5.0	12	30.8	6	20.0
Adequate	189	43.1	16	41.0	16	53.3
Highly Adequate	227	51.7	5	12.8	5	16.7

Of the children with autism, 14 (35.9%) were slightly adequate while 14 (35.9%) were adequate in terms of mental ability according to teachers. Of the children with mental retardation, 19 (63.3%) were slightly adequate while 7 (23.3%) were quite inadequate in terms of mental ability according to teachers (Table 2).

Of the children with normal development 204 (46.5%) were adequate and 198 (45.1%) were highly adequate in terms of school adaptation. Of the children with autism 11 (28.2%) were slightly adequate; 17 (43.6%) were adequate in terms of school adaptation. Of the children with mental retardation, 15 (50.0%) were adequate and 10 (33.3%) were slightly adequate in terms of school adaptation (Table 2). Of the children with normal development 203 (46.2%) were adequate and 174 (39.6%) were highly adequate in terms of social competence. Of the children with autism 19 (48.7%) were slightly adequate; 9 (23.1%) were adequate in terms of social competence. Of the children with mental retardation, 15 (50.0%) were slightly adequate; 7 (23.3%) were adequate in terms of social competence (Table 2).

Of the children with normal development 227 (51.7%) were highly adequate and 189 (43.1%) were adequate and in terms of physical competence. Of the children with autism 16 (41.0%) were adequate and 12 (30.8%) were slightly adequate in terms of physical competence. Of the children with mental retardation, 6 (20.0%) were slightly adequate; 16 (53.3%) were adequate in terms of physical

competence. Quite inadequate and slightly adequate groups were combined and termed as inadequate since the number of children observed was low (Table 2).

3.3. Book scores in relation to mental ability

The general (F=28.433;p=0.000<0.05), quantitative (F=28.241; p=0.000<0.05) and qualitative book scores (F=28.433; p=0.000<0.05) were determined to be significantly associated with the adequacy of mental ability as evaluated by teachers. General, quantitative and qualitative scores of the children with inadequate mental ability were determined to be significantly lower than the scores of the children with adequate and highly adequate mental ability. Besides, qualitative book scores in children with adequate mental ability were significantly lower than scores in children with highly adequate mental ability (Table 3).

Table 3. The theory of mind book scores in terms of the teachers' views on the mental ability, school adaptation, social and physical competences

Book Scores	Teachers' views						F	p value
	Inadequate		Adequate		Highly Adequate			
	Mean	SD	Mean	SD	Mean	SD		
Mental ability								
Total quantitative score	43.835	10.110	51.424	10.171	53.447	9.872	28.241	**0.000**
Total qualitative score	3.153	3.096	6.093	3.914	7.153	4.678	28.433	**0.000**
General score	47.224	11.989	57.478	13.182	60.419	13.635	30.714	**0.000**
School adaptation								
Total quantitative score	45.443	10.807	50.764	10.397	53.218	9.956	14.986	**0.000**
Total qualitative score	3.821	3.846	5.891	4.118	7.005	4.513	14.916	**0.000**
General score	49.257	13.762	56.706	13.434	60.032	13.564	16.586	**0.000**
Social competence								
Total quantitative score	45.468	10.664	51.372	10.244	54.051	9.528	24.846	**0.000**
Total qualitative score	3.707	3.354	5.995	4.170	7.594	4.503	30.188	**0.000**
General score	49.437	12.981	57.273	13.383	61.443	13.256	28.018	**0.000**
Physical competence								
Total quantitative score	43.896	11.216	50.505	9.926	52.916	10.374	15.881	**0.000**
Total qualitative score	2.802	3.335	5.852	4.086	6.890	4.475	19.230	**0.000**
General score	46.719	13.812	56.393	12.933	59.654	13.896	18.788	**0.000**

3.4. Book scores in relation to school adaptation

The general (F=16.586; p=0.000<0.05), quantitative (F=14.986; p=0.000<0.05) and qualitative book scores (F=14.916; p=0.000<0.05) were determined to be significantly associated with the adequacy of school adaptation as evaluated by teachers. General, quantitative and qualitative scores of the children with inadequate school adaptation were determined to be significantly lower than the scores of the children with adequate and highly adequate school adaptation. Besides, general, quantitative and qualitative book scores in children with adequate school adaptation were significantly lower than scores in children with highly adequate school adaptation (Table 3).

3.5. Book scores in relation to social competence

The general (F=28.018; p=0.000<0.05), quantitative (F=24.846; p=0.000<0.05) and qualitative book scores (F=30.188; p=0.000<0.05) were determined to be significantly associated with the adequacy of social competence as evaluated by teachers. General, quantitative and qualitative scores of the children with inadequate social competence were determined to be significantly lower than the scores of the

children with adequate and highly adequate social competence. Besides, general, quantitative and qualitative book scores in children with adequate social competence were significantly lower than scores in children with highly adequate social competence (Table 3).

3.6. Book scores in relation to physical competence

The general (F=18.788; p=0.000<0.05), quantitative (F=15.881; p=0.000<0.05 and qualitative book scores (F=19.230; p=0.000<0.05) were determined to be significantly associated with the adequacy of physical competence as evaluated by teachers. General, quantitative and qualitative scores of the children with inadequate social competence were determined to be significantly lower than the scores of the children with adequate and highly adequate social competence. Besides, general, quantitative and qualitative book scores in children with adequate physical competence were significantly lower than scores in children with highly adequate physical competence (Table 3).

3.7. Book scores in relation to school attendance

Correlational analysis revealed no significant relation between school attendance and general (r=0.027; p=0.546>0.05), quantitative (r=0.014; p=0.756>0.05) and qualitative (r=0.033; p=0.456>0.05) book scores (Table 4).

Table 4. Correlation analysis for the relationship between school attendance and the theory of mind

		Theory of Mind Book Scores		
		Total quantitative score	**Total qualitative score**	**General score**
School Attendance	r	0.014	0.033	0.027
	p	0.756	0.456	0.546
	N	503	503	503

Children's school attendance explain all book total quantitative score at a ratio of 0.019 (R^2=0.019). Regression analysis performed to test whether children's time of attending the classes were affected was found to be statistically significant (F=3.466; p=0.008<0.05). Children's time of attending the classes did not statistically affect all book total quantitative scores (t=0.308; p=0.758>0.05). Children's time of attending the classes explained all book total qualitative at a ratio of 0.020 (R^2=0.020) indicating that there is no correlation between time of class attendance and ToM (Table 5).

Table 5. Regression analysis for the relationship between school attendance and the theory of mind

Dependent Variable	Independent Variable	ß	t	p	F	Model (p)	R^2
General score	Constant	45.795	13.46	**0.000**	3.98	**0.003**	0.024
	School attendance	0.035	0.18	0.860			
Total quantitative score	Constant	43.647	16.91	**0.000**	3.42	**0.009**	0.019
	School attendance	-0.009	-0.06	0.951			
Total qualitative score	Constant	2.682	2.51	**0.012**	3.47	**0.008**	0.020
	School attendance	0.019	0.31	0.758			

4. DISCUSSION

Our findings revealed high levels of ToM in children who were determined by teachers to be adequate or highly adequate in terms of mental ability, school adaptation, social competence and physical competence with no significant influence of school attendance on ToM level.

Higher scores in theory of mind storybook test in the children with adequate or highly adequate mental ability in our study population support the significant relationship between ToM and intelligence reported in a past study by Buitelaar, Wees, Swaab-Barbeveld and Gaag (1999) on the verbal intelligence, IQ and status of being aware of emotions in children with autism.

Unlike our findings, Rajkumar, Yovan, Raveendran and Russel (2008) reported that there was no significant relationship between general intelligence and theory of mind, while Happe (1994) reported that intelligence test and sub-tests gave varying results in individuals with autism in terms of theory of mind and that they could not obtain similar results. The inconsistency of available data on the relation between intelligence and ToM can be explained by individual differences. In our study, based on teachers' views and thus observable abilities of individuals, it can be stated that children with autism in the study showed similar characteristics in certain points. Berns and Assouline (2012) carried out a study on highly functional young individuals with autism and found a positive significant relationship between intelligence and ToM. Muris, Steerneman, Meesters, Merckelbach, Horselenberg and van den Hogen (1999) analyzed the relationship between WISC-R and theory of mind and found a significant relationship. These results are consistent with the findings of Blijd-Hoogewys and van Geert (2008). The studies of Ozonoff, Rogers, and Pennington (1991), Happe (1994), Buitelaar et al. (1999), Muris et al. (1999) and Brüne (2003) also support the results of our study.

ToM first develops by social awareness and communication with others (Hale & Tager-Flusberg, 2005). Communicative situations such as social communication, cognitive emotional capacities, gestures, and emotional body posture and speech tone in harmony with the environment should be used for social adaptation (Tanguay, Robertson, & Derrick, 1998). Walker (2005) designed a study to analyze the relationship between friendship relationships, social capacity and theory of mind by administering three—five-year-old children a theory of mind test consisting of two wrong belief tests. In addition, the teachers were asked to fill in scales to evaluate the social behaviors of children (aggressive, destructive, and shy). The results of the study showed that when age was taken in account, ToM could predict social behaviors in males and females. Peterson, Garnett, Kelly and Attwood (2009) reported that complexity of social life had an adverse effect on the development of ToM in children with autism. Researchers developed a two-stage study to support the development of daily communication and social skills in the development of ToM in children with autism (399 children, of which 85 were with autism, 230 showed Asperger's syndrome and 24 were with normal development). This scale consisted of questions to determine mental reading difficulties in children with autism found hard in daily life through psychometric measurements. On the other hand, in the second study, teachers were asked to fill in scales to determine teachers' views on ToM in the experimental set up and in the daily life. Then 25 participants at the age of twelve were analyzed (15 with autism, 10 with normal development). Although children with autism passed ToM tests, they received much lower scores than their peers in mental reading in daily life. This indicates the importance of communication with friends in addition to familial communication. In another study which analyzed the scales filled in by teachers, it was found that there was a positive relationship between ToM and social components. In the same study, the ToM abilities of children with inadequate possibilities were found to be lower than those having a better school with better conditions (Liddle & Nettle, 2006). A review of the literature revealed no data on the type of physical competence analyzed in our study. However, considering the physical modeling stage in the use of modeling abilities, it can be stated that active usage of one's physical abilities is important in terms understanding other people's beliefs and desires.

5. CONCLUSION

In conclusion, based on our findings indicating the significant impact of mental ability, school adaptation, social competence and physical competence on ToM, approaching child development as a whole by the specialists who work on children with different developmental characteristics and designing studies for this aim in a multifaceted fashion seems to have a positive impact on development of theory of mind and social cognition processes of children.

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PRIMARY SCIENCE STUDENTS' APPROACHES TO INQUIRY-BASED LEARNING

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ABSTRACT

Pri-Sci-Net,an EU funded FP7, is a project that promotes inquiry-based learning in science at the primary education level through developing activities for teachers to use as well as setting up a Europe-wide network for professionals and academics in the area of Primary Science Education. In this context, two science activities, '*The secret of the human body*' and '*Pigment research*', were developed for the 9-11 age group and were applied to the students in this study.An observation protocol and semi-structured interviews with students were used for collecting data. The results of the study showed that students were convinced about, and realized the importance of, doing inquiry-based activities in learning science. Activities were mediated to create an inquiry-based social science environment. Even poor academic performance students were very active during the activities since all thoughts were considered valuable.

Keywords: Inquiry-based learning, primary level students, inquiry-based science activities.

INTRODUCTION

As a learning activity, inquiry-based learning (IBL) refers to the activities of students in which they develop knowledge and understanding of scientific ideas as well as an understanding of how scientists study the natural world (Anderson, 2002). Inquiry is based on scientific investigation through classroom practices such as posing questions, and it is concerned with knowledge acquisition and development (Blanchard, Southerland, & Granger, 2008). The main reason for its widespread acceptance and usefulness in science teaching is that it is compatible with human nature. From the moment we open our eyes to nature, all of our learning, except our instinctive behaviors, is based on our observations and inquiries. Therefore, all of our observations, learning needs, and inquiries require asking the right questions. IBL begins with questions based on real observations, and then proceeds through discussions and explanations based on evidence (Cuevas, Lee, Hart, &Deaktor, 2005). Consequently, it can be said that inquiry is the art of questioning and the art of raising questions.

Most instructors match IBL with hands on activities. This is a correct approach to some extent, but IBL learners are not just active learners; the activation is also in the learners' minds. IBL is in the learner's mind because the main knowledge construction is part of the learner's thinking. In this method, the learner is asking and refining questions, planning and designing how to answer their ideas, sharing ideas, making sense of data and designing and conducting experimental work. All these activities are mental processes and engage learners to become active learners.

The research on IBL in terms of implementing this theory in education varies according to different topics. It includes work on conceptual understanding (e.g., Anderson, 2002;Dalton and Morocco, 1997), attitudes and perceptions toward science (e.g., Anderson, 2002; Shymansky, Kyle, &Alport, 1983; Spronken-Smith,2012), critical thinking (e.g., Anderson, 2002; Panasan&Nuangchalerm, 2010), academic achievements (e.g., Marx et. al., 2004; Wolf and Fraser, 2008) scientific processing skills, cognitive achievement (e.g., Anderson, 2002;Krajcik, et. al., 1998; Panasan&Nuangchalerm, 2010;

Shymansky et. al., 1983, Lawson, 2010; Wu, et. al., 2006)and learning content as well as discipline-specific reasoning skills and practices (e.g., Hmelo-Silver et. al., 2007; Khishfe and Abd-El-Khalick, 2002).In addition, to address the impact of inquiry-based science instruction on K–12 students,Minner et al. (2010) synthesized the findings from research conducted between 1984 and 2002.Overall, research suggests that using IBL with students can help them become more creative, more positive and more independent. A systematic approach to the development of IBL skills is essential to prepare students both for problem solving and lifelong learning.

The Pri-Sci-NetVision of IBL for Children

Pri-Sci-Netis an EU fundedFP7supporting and coordinating action (Call SiS-2010-2.2.1.1) on innovative methods in science education: teacher training on inquiry-based teaching methods on a large scale in Europe.The project is coordinated by the Malta Council for Science and Technology (MCST) and has 17 partners from 14 countries.

Within the vision offered by the Pri-Sci-Net Project,inquiry-based science at the elementary school level involves a framework of teaching and learning that comprises applications for learning science, learning to do science, and learning about science (National Research Council, 2000).

In this framework:

Children:
- engage activelyin the learning process with an emphasis on observationsand experiences as sources of evidence;
- tackle authentic and problem-based learning activities, where the correctness of an answer is evaluated only with respect to the available evidence and getting to a correct answer may not bethe main priority;
- practice and develop the skills of systematic observation, questioning, planning and recording to obtain evidence;
- participate in collaborative group work, interact in a social context, construct discursive argumentation and communicate with others as the main process of learning;
- developautonomyand self-regulation through experience.

Purpose of the research

Since the school programs are promoting IBL in science at the primary level, it is important to provide professional support to both students and teachers to help them use inquiry based learning in their teaching and learning. Pri-Sci-Net is one of the projects that promotes inquiry-based learning in science at the primary level of education, both through developing activities for teachers to use with students, and through the setting up of a Europe-wide network for professionals and academics in the area of Primary Science Education. In this context, two science activities were developed for the 9-11 year old age group and were applied to the students in this study. Since many studies on the impact of IBL activities on students' thoughtsare purely descriptive,the main aim of this study was to gain an understanding of students' approaches to IBL.

MATERIALS AND METHODS

Participants

This study was restricted to two urban public elementary schools located in the Mediterranean region of Turkey.The study used purposeful and convenience sampling procedures (Johnson & Christensen 2004), which offer a non-random method of sampling where the researcher selects information-rich cases for study in depth. The study was conducted with sixty fifth grade elementary school students (32 male and 28 female, mean-age 11), and the interviews were held with eight volunteer students (5 female and 3 male)from among these participants.

Data collection instruments

An observation protocol and semi-structured interviews with students were used for collecting data. The observation protocol consists of three main parts and sub-divisions. These three main parts were also coding schemes for qualitative data analyses which were conducted by two researchers. The level of students' engagement in scientific thinking and discourse, the level of students' work with evidence and formulation of explanations, and the level of students' reflection on the process of their inquiry were observed and noted.

Semi-structured interviews were framed around three questions: whether the students enjoy the activity, what did they like or not like; whether they had previously done science activities in this way and whether they like to work with their friends.

Activities used in this research

Teachers generally claim that science classesassociated with the use of inquiry is time consuming since the activities span several classsessions, which conflicts with the complete core curriculum. Therefore, this study used two small-scale inquiry activities that only required 2 or 3 class sessions for completion, and which utilizedonly the key aspects of inquiry that challenge students. Both activities were applied to two different classes from two different schools that participated in this study.

The first activity,'The secret of the human body' (Author: Mgr. Dagmar Kubátová, PhD),encourages students to formulate a hypothesis about changes in heart rate intensity during various activities and to verify it experimentally. Students were then asked to compare the established results among themselves and explain the differences between individuals in the group. The second activity,'Pigment research' (Authors: JiříŠkoda, PavelDoulík),stimulated the students to observe the separation of colors and to reason based on their evidence. The activities used in this study were developed for the Pri-Sci-Net project.

RESULTS AND DISCUSSION

The results of classroom observation

Before doing the activities, questions that enable students to discover answers through their own hands-on experiments or through their own observation were asked. The goal was to encourage students to go beyond the idea of just memorizing facts and move them toward taking the initiative and responsibility for their own learning. The classroom observation is reported in terms of the observation protocol.

The level of students' engagement in scientific thinking and discourse

Before starting the pigment activity, the instructor asked the children whether the color of black ink in the pen contains different colors. The students started questioning and came up with several ideas. The

instructor wrote all the ideas on the board without judging. This encourages students to talk more. The ideas of the students were as follows:

- *black consist of only primary colosr (yellow, red, blue),*
- *there are no primary colors in black (dark blue, brown, gray),*
- *One cannot say whether there are primary colors in black since black is the combination of all colors,*
- *black contains only dark colors,*
- *black contains only light colors,*
- *There may be some dark and some light colors in black, since dark and light colors complement each other,*
- *black has only its own color.*
-

At this point, the students were ready to hear the teacher's answer since they thought that, after this brainstorming, their job was finished; now, they thought, it was time to get answer.

One student asked: *"Teache,r what is the answer"*
Instructor: *"I am not sure. We should find a way to discover that"*

Students were surprised since this was not the teaching approach they were used to. Many of them were extremely curios about which answer on the board was right. Consequently, theywere already engaging in scientific thinking and discourse even despite some of the students claiming that science is boring.

During the other activity, 'The secret of the human body', the students decided to measure their heartbeat not only after the activities, but also before the activities since this meant they could make a comparison. This was a significant decision in terms of IBL since the students found the activity interesting (engaging) and dynamic. They formed predictions, collected data, worked together, recordedthe data anddrew conclusionsthrough discussion.

The level of students' working with evidence and formulating explanations

In terms of developing explanations(*e.g. How changes in heart rate intensity during various activities?*), it is the instructor who leads the discourse and stimulates the students to formulate predictions and explanations. In addition, the instructor took the lead in creating a challenging situation such as by creating the bar graphs and guiding children to reason based on their evidence. At the end of the activity, the instructor told the students that they had worked as scientists and gavethem scientific explanations based on their evidence.Students did their observation in terms of their hypothesis and decided whether it wascorrect or not, and they also discussed contradictory situations with their friends.

Student e.g. "We shared our observation results, and different stuff. We looked at the results of the other groups"

In 'the secret of the human body' activities, students worked as a group (See picture 1). In each group there were five students. One student was counting the sounds of a heartbeat per minute using a stethoscope, one was responsible for the timing, and the others were doing the activities. Having a real stethoscope to use made the children very excited. They immediately became engaged with the activity. It should be noted, however, that in some cases some students missed counting the heartbeat because of the crowded environment and the noise. The classroom was not big enough for 5 groups which had 5 students in each. Therefore, by the end of the activity the instructor had to explain that some data should be ignored because of observer error. Nevertheless, the students were having the

chance to do real science, and their interest and excitement contributed to the noise level in the room. During the pigment research activity, there were also problems because students became tired or lost interested while waiting for the separation of the pigment (which takes approximately 15 minutes.See picture 2). However, the instructor immediately found a solution by motivating students throughout the experiment by asking questions and encouraging the students to do observations and take notes. Tosum up, during the activities the teacher wrote all the results on the board and had students communicate procedures, evidence and explanations. The instructor guided the studentsthrough questioning. The activity's data allowed students to make actual comparisons(See picture 3).

Picture 1. Students are working together

Picture 2. Students are observing pigment separation
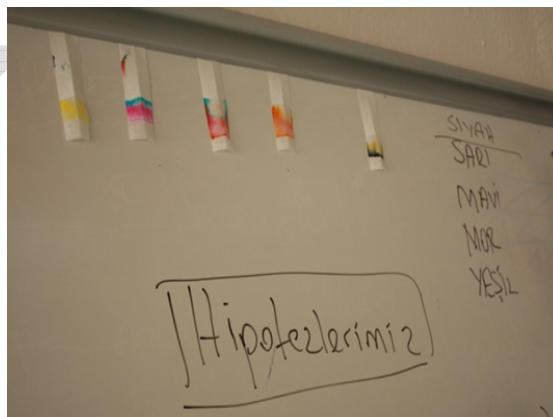
Picture 3. The activity's data allowed students to make actual comparisons

The level of students' reflection on the process of their inquiry

The students had a chance to behave as real researchers and do hands on experiments. Using real tools like a stethoscope, chromatography paper,a chronometer etc. excited and motivated them as the comment of one student shows:

> *"This experiment was quite different. It was like a real experiment, I mean, I felt like I was anproper researcher. We collected information through research in that experiment"*

The results of the observationssuggest that, that since the students are used to taking more traditional courses, they are much closer to structured inquiry (Staver and Bay, 1987), where teachers provide an issue or problem and an outline for addressing it. However, an assumption can be made that students would like to move to guided inquiry (Staver and Bay, 1987), where teachers provide questions to stimulate inquiry, but students are self-directed in terms of exploring these questions. Finally, very structured curriculums and exam systems (like those in Turkey, for example) make it difficult to apply open inquiry (Justice et al., 2002) where students formulate the questions themselves as well as going through the full inquiry cycle.

The results of semi-structured interviews

Semi-structured individual interviews wereused to establish the validity of the observation by ensuring that the researchers' interpretationscorresponded to those of the participants. During the interviews, follow-up questions were used to probe students' ideas in-depth, and to explore the relationships between these ideas. The interviewer avoided directivecues, and limited her discourse to encouraging participants to elaborate and clarify their ideas.All interviews, which typically lasted for about 15 minutes, were videotaped and transcribedverbatim for analysis.The categories and examples drawn fromthe interview data are reported as follows:
Students expressed their thoughts on how they faced questions with more than one possible answer.

Student 7: *During the pigment research, I assumed that there was only one answer. But the teacher wrote all the answers on the blackboard.*

Student 4: *...We could not count the heartbeat properly because of the noise in the classroom. Yet the teacher still wrote our result on the board. We discussed why our result is different from the others. The teacher thanked our group for bringing 'observer error' to our friends' attention. I learned that it is very important to minimize observer error while doing experiments...*

Students stated that they learned how to solve problems and answer questions. They reflected on how they feel like real researchers. In addition, many of the students in the classrooms were from different schools. Thus, the researchers had an opportunity to learn more about the profile of science classes in the town generally. The results showed that students have little experience of doing experiments. What is more, many of them were of the opinionthat science means rote learning without asking questions:.

Student 2: *Teacher!This experiment was different. It was like a real experiment, I was like a real researcher...*

Interviewer: *...I would like to ask you whether you used to do experiments like this.*
Student 1: *When I was in 3rd grade we did experiments.*
Interviewer: *Do you remember how you did the experiments?*
Student 1: *For example, we measured the temperature with a thermometer or something, but didn't do anything like this.*
Interviewer:*... the teacher was measuring or eachone of you had a thermometer?*
Student 1: *The teacher was measuring, and we were watching. He did not allow us to touch anything.*

…
Interviewer: *Well where do you feel you are a scientist? In the activity you did in 3rd grade or here?*
Student 1: *Absolutely here.*
Interviewer: *Why?*
Student 1: *Because we were not doing research there. Our teacher was doing most of the things, and we were watching. But here, we are doing all the things by ourselves, even the experiments. We did everything by ourselves. That feels good!*

Interviewer: *What were you doing in science classes last year?*
Student 8: *Our teacher was very authoritarian, he was reading from the book and we were writing what he says. Then…he never ever made us do experiments. He always talked like that. You know,without doing anything visually.*

Students expressed their thoughts on how they discussed things with others and learned more than they had expected.

Student 3: *…let's say I talked with some friends from other groups. For instance they were thinking there is only black in black color. Then I said there are other colors in black. After the experiment they said I was right…And then I also learned from the experiments about drawing graphs, measuring, using different tools, how to do experiments at home and how to do research.*

Student 5: *…I learned about working as a group since everyone has their own responsibility.*

Overall,the results of the study showed that students were convinced about, and realized the importance of, doing inquiry-based activities when learning science. Activities were mediated to create an inquiry-based social science environment. Even poor academic performance students were very active during the activities since all of the students' thoughts were valued.

CONCLUSION AND FURTHER IMPLICATIONS

The aim of this research was to understand students' approaches to inquiry based learning.The research showed that students feel as if they are real researchers while doing the activities. Moreover, they were more creative, more positive and more independent throughusing IBL. In addition, students were involved in their learning and developed solutions. However, students were in need of more inquiry-based style classes for further, higher-order learning. IBL was a new approach for many of the students in this research. Therefore, they had difficulties in synthesizing findings, relating to new questions, and going through the full inquiry cycle.

Each stage of the activities done in this research contributes to the creation of scientific knowledge. The skills acquired during the execution of the activitieswill lead to *learning to do science*; the students who find answers to their questions at the end of the activity will gain knowledge *learning about science*, and those who make use of the process to solve ordinary everyday problems internalize the experience of *learning science* andbenefiting from what they have learned. Choosing activities from everyday life that have been designed within this basic framework provides motivation for both students and teachers. Moreover, when knowledge acquired in school can be used in solving problems encountered in everyday life, that knowledge becomes all the more meaningful for the individual learner. Our research involved only two classrooms and eight cases, which meant small sample sizes. Thus, further research should be conducted using a bigger sample with demographic subgroups. Furthermore, research should be undertaken regarding what kinds of designneeds exist for learning environments in order to foster science inquiry among all elementary students.

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