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Pre-Service Teachers' Opinions on Teaching Thinking Skills[1]

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The purpose of the present study is to determine pre-service teachers' opinions on teaching thinking skills. 134 senior pre-service pre-school, English and mathematics teachers studying at a state university in Istanbul participated in the study which is designed based on survey model. A questionnaire which was developed by the researchers was used in data collection and percentage and frequency values were calculated for the data analysis. The results showed that pre-service teachers thought that thinking skills could be taught and teaching thinking skills should begin in pre-school level. They regarded the mixed approach as the most effective approach in teaching thinking skills. They considered that teachers' and administrators' modeling were considerably important in thinking-friendly classrooms and schools. They believed that being open to different opinions was the most important attribute of teachers who promote thinking. Pre-service teachers perceive themselves partially competent in developing students' thinking skills in the future. However, they emphasized the need for training in teaching thinking skills at schools.

Key Words: thinking skills, curriculum and instruction, teaching thinking skills, critical thinking, creative thinking

INTRODUCTION

Several definitions and frameworks have been proposed about thinking and thinking skills which is one of the significant study issues in the areas of philosophy, psychology and education. Thinking, in general terms, can be defined as "the operating skill with which intelligence acts upon experience" (De Bono, 1987, p.218). Developing the quality of thinking has always been one of the main goals of education; hence, thinking skills are needed to be taught in order to meet the expectations of the present century

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from individuals (McGuinnes, 1999). Within this context, developing thinking which constructs a baseline for all of the courses at school is regarded as both an instrument for meaningful learning of the courses and a goal itself (McTighe & Schollenberger, 1991). Learners' effective thinking may be ensured through the ways such as asking questions requiring higher-order thinking, using writing activities and applying several strategies (Marzano, 1993). Therefore, curricula for thinking skills, based on a theoretical framework and expected to be developed both within and out of the courses, not only facilitate learners to transfer effective thinking skills into the other parts of their life, but also have a positive impact on their academic achievement (Hu, et. al, 2011).

CONTEXT AND LITERATURE REVIEW

Majority of research on thinking skills addresses the types of thinking such as creative thinking, critical thinking, problem solving, decision-making and higher-order skills (Burke, Williams & Skinner, 2007). In the societies that are undergoing rapid developments in science and technology on the one hand and struggling to overcome various global problems on the other hand, critical thinking is considered as one of the key skills for individuals to adapt to this global climate (Hughes, 2014; Yang & Chung, 2009). Studies are conducted for developing teaching or developing critical thinking skills in different levels of formal education (Jackson, 1986; Pena & Almaguer, 2012; Yang & Chung, 2009). The report published by American Philosophical Association proposes that developing critical thinking skills and dispositions are needed to be regarded as an objective for K-12 curricula (Facione, 1990). In order to achieve this goal, McCall (2011) notes that it is considerably important to provide learning environments where different perspectives are welcomed and respected, and different opinions are encouraged. Studies indicate that the most effective method in developing critical thinking skills is to teach them directly as well as providing opportunities to learners for practicing them in other courses (Abrami, et. al, 2008; Heijltjes, Van Gog & Paas, 2014).

Creative thinking is one of the skills that is acknowledged as the 21st century skill (Larson & Miller, 2011; Ravitz, et al., 2012; Voogt & Roblin, 2012). Creative thinking incorporates aspects of fluency, flexibility, originality and elaboration (Torrance, 1962). Research on creative thinking indicates that factors such as flexible use of time and place, providing appropriate materials, working outside the school building, game-based learning approaches, interaction with teachers and learner, opportunities for peer interaction and awareness of learner needs promote learners' creative thinking skills (Davies, et al., 2013). Further research demonstrates that creative thinking skills can be developed via various methods and techniques such as brainstorming, SCAMPER, analogies and collaborative group work (Eragamreddy, 2013; Gregory, et. al, 2013).

Problem solving skills can be considered as one of the key skills that individuals need to acquire for attaining achievement in their personal, social and working life. It is important to know what the problem is in order to understand problem solving skills more accurately. Mayer (1998) proposes that problem solving involves cognitive (instructional goals, processing knowledge), metacognitive (strategies for reading and writing) and motivational (interest, self-efficacy) dimensions and successful problem

solving in academic environments requires taking all of these dimensions into consideration. It is seen that studies on teaching or developing problem solving skills demonstrate favorable results (Cote, et al., 2014; Serin, 2011; Woodward, Carnine & Gersten, 1988).

Decision-making requires a selection among the possible alternatives. Decision-making skill, which is comprised of the procedures such as being aware of the situation to be decided, producing alternatives, evaluating alternatives, preferring one of the alternatives, re-evaluating and implementing the preferred alternative, and checking the result, is influenced by social factors, types of the decision, importance of the decision and personal factors (Halpern, 1997). Eggert, et.al (2013) proposes that collaborative learning strategies develop learners' decision-making skills. Researches on decision-making skills address that those skills can be developed. Approach to the issue to be decided, decision-maker and environmental factor in decision-making process are significant factors that determine the decision. There seems some differences in decision-making process depending on gender, age (Lizarraga, Baquedano & Cardelle-Elawar, 2007), duration of education (Eggert & Bögeholz, 2010) and other individual differences such as socio-economic status and cognitive ability (Bruin, Parker & Fischhoff, 2007).

The role of well-trained teachers in teaching thinking skills is considerably important (Akınoğlu, 2001). Teachers need to have knowledge about thinking skills, know how to teach those skills through activities including thinking skills, become aware of the difficulties that learners may encounter, and develop preventive methods for those difficulties in order to enable learners to become effective thinkers rather than transferring knowledge to their learners (Zohar & Schwartzer, 2005). It is also thought that teachers' awareness should be raised and several regulations should be made for ensuring teachers to acquire essential skills in teacher education process in order to help them attain proficiency in teaching thinking skills.

The number of the studies conducted with pre-service teachers on teaching thinking skills is rather limited. Alwehaibi (2012) proposed a program for pre-service English language teachers to develop their teaching for thinking skills while Harrison (2013) showed the use of interactive whiteboard in teaching higher order thinking skills to preservice teachers. Nevertheless, it is thought that pre-service teachers' opinions on teaching thinking skills may have an impact on their future practices. Within this scope, the purpose of the present study is to determine pre-service teachers' opinions on teaching thinking skills.

METHOD

Information about research model, study group, data collection instrument, data collection procedure and data analysis are presented in this section.

Research Model

This study whose purpose is to determine pre-service teachers' opinions on teaching thinking skills was designed with descriptive survey model. The aim of descriptive

survey models is to describe, compare, analyze and interpret the situations of individuals, institutions, groups or sources in the way they are (Cohen, Manion & Morrison, 2007).

Sample

134 senior pre-service teachers participated in the study who studied in pre-school education (PSE), English language teaching (ELT) and primary mathematics education (PME) departments at a state university in Istanbul in 2014-2015 academic year. Criterion sampling method, which is one of the purposive sampling methods was used in this study. Department is a criterion for sampling. The participants were selected from three departments since thinking skills such as creative thinking and problem solving are underlined in pre-school, English and mathematics curricula developed by Board of Education in Turkey. Another criterion is that pre-service teachers were in their last year at university, which means that they enrolled in an internship program. Table 1 exhibits the distribution of pre-service teachers according to departments.

Table 1: Distribution of pre-service teachers according to departments

Departments	*f*	*%*
Pre-School Education	59	44.03
English Language Teaching	54	40.30
Primary Mathematics Education	21	15.67
Total	134	100

Data Collection Instrument

A questionnaire developed by researchers based on literature review was used for data collection in the study. The related literature was reviewed comprehensively, questionnaire items were determined, expert opinions were taken and a pilot study was conducted with a group of pre-service teachers in the development process of the questionnaire. First of all, 57 items were written down for constructing the questionnaire. After expert opinions were taken from three experts studying in educational sciences department, the number of items reduced to 43 items. Validity of the questionnaire was attempted to be ensured in this way. Cronbach's reliability coefficient of the questionnaire was also found to be .76. Reliability coefficient value of .70 and more indicates an adequate reliability (Büyüköztürk, 2011). The questionnaire consists of four sub-dimensions, one of which is related to teaching thinking skills. This sub-dimension includes 12 close-ended questions which were used in this study. The reliability coefficient of this sub-dimension was found to be .56.

Data Collection and Data Analysis

Data of the study were collected by the researcher within the class hours in the spring semester of 2014-2015 academic year. Descriptive statistics such as percentage and frequency distributions were calculated for the data analysis.

FINDINGS

This section includes the findings that demonstrate pre-service teachers' opinions on teaching thinking skills. Table 2 presents their opinions on whether thinking skills (TS) can be taught or not.

Table 2: Opinions on whether thinking skills can be taught or not

Departments	*Yes*		*No*		*Partially*		*Other*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Pre-School Education	42	71.2	0	0	8	13.6	9	15.3
English Language Teaching	30	55.6	1	1.9	18	33.3	5	9.3
Primary Mathematics Education	17	81.0	1	4.8	1	4.8	2	9.5
Total	89	66.4*	2	1.5	27	20.1	16	11.9

It is seen in Table 2 that pre-service teachers (66.4%) consider that thinking skills can be taught. Table 3 displays their opinions on the level of education when teaching thinking skills should begin and when it is more effective.

Table 3: Opinions on teaching thinking skills (TTS) and level of education

Departments	*Level (TTS)*	*Pre-School*		*Primary School*		*Middle School*		*Secondary School*		*University*		*Nothing*	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
PSE	Beginning	58	98.3	0	0	0	0	1	1.7	0	0	0	0
	Effectiveness	40	63.5	12	19.1	5	7.9	4	6.4	2	3.2	0	0
ELT	Beginning	29	53.7	18	33.3	6	11.1	0	0	0	0	1	1.9
	Effectiveness	7	13.0	13	24.1	13	24.1	19	35.2	2	3.7	0	0
PME	Beginning	15	71.4	4	19.0	1	4.8	0	0	0	0	1	4.8
	Effectiveness	4	19.0	6	28.6	7	33.3	2	9.5	2	9.5	0	0
Total	Beginning	102	76.1*	22	16.4	7	5.2	1	0.7	0	0	2	1.5
	Effectiveness	51	37.0*	31	22.5	25	18.1	25	18.1	6	4.3	0	0

Table 3 displays that pre-service pre-school teachers think that pre-school is both the beginning level (98.3%) and effectiveness level (63.5%) of teaching thinking skills. Pre-service English teachers believe that the beginning level of teaching thinking skills is pre-school (53.7%), yet the effectiveness level is secondary school (35.2%). Pre-service mathematics teachers also consider that pre-school is the beginning level of teaching thinking skills (71.4%), however, the effectiveness level is middle school (33.3%). In general terms, pre-service teachers consider pre-school level as both the beginning level (76.1%) and effectiveness level (37%) of teaching thinking skills. Pre-service teachers'

opinions on the most effective approach for teaching thinking skills are presented in Table 4.

Table 4: Opinions on the most effective approach for teaching thinking skills

Approaches for teaching thinking skills	*PSE*		*ELT*		*PME*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Subject-based approach (Teaching thinking skills and content in parallel)	1	1.7	1	1.8	2	8.7	4	2.9
Content-based approach (Integrating thinking skills in course content implicitly)	12	20.3	21	38.2	4	17.4	37	27.0
Skill-based approach (Teaching thinking skills in a separate context/General approach)	10	16.9	7	12.7	4	17.4	21	15.3
Mixed approach (Integrating subject-based and skill-based approaches)	33	55.9	26	47.3	12	52.2	71	51.8*
Nothing	3	5.1	0	0	1	4.3	4	2.9

Table 4 shows that 51.8% of the pre-service teachers consider mixed approach as the most effective approach in teaching thinking skills. Table 5 presents pre-service teachers' opinions on the most important feature of thinking-friendly classroom environment.

Table 5: Opinions on the most important feature of thinking-friendly classroom environment

Features of a thinking-friendly classroom environment	*PSE*		*ELT*		*PME*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Physical characteristics of the classroom	6	3.9	3	2.0	2	3.6	11	3.0
Teacher modelling in using effective thinking skills	36	23.5	40	26.1	16	28.6	92	25.4*
An open atmosphere based on research and inquiry	32	20.9	27	17.6	7	12.5	66	18.2
Communication and interaction promoting thinking between learners	26	16.9	28	18.3	15	26.8	69	19.1*
Active participation in activities promoting thinking	32	20.9	25	16.3	8	14.3	65	18.0
Classroom arrangement enabling learners to talk and discuss with each other	20	13.1	30	19.6	7	12.5	57	15.7
Other	1	0.7	0	0.0	1	1.8	2	0.6

It is seen in Table 5 that pre-service teachers consider modeling (25.4%) and communication and interaction (19.1%) more important than other features. Table 6 displays pre-service teachers' opinions on the most important feature of thinking-friendly school environment.

Table 6: Opinions on the most important feature of thinking-friendly school environment

Features of a thinking-friendly school environment	*PSE*		*ELT*		*PME*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Democratic school culture	29	27.1	24	22.6	11	26.2	64	25.1
School conditions and technological equipment	12	11.2	11	10.4	2	4.8	25	9.8
Mission of growing effective thinker and learner	28	26.2	32	30.2	14	33.3	74	29.0*
Administrator and teacher modeling in thinking skills	38	35.5	39	36.8	15	35.7	92	36.1*
Other	0	0	0	0	0	0	0	0

Table 6 shows that pre-service teachers regard administrator and teacher modeling (36.1%) and mission of growing effective thinker and learner (29%) as the important features of thinking-friendly classroom environment. Pre-service teachers' opinions on the most important characteristic of teachers promoting thinking skills are presented in Table 7.

Table 7: Opinions on the most important attribute of teachers promoting thinking skills

Attributes of teachers promoting thinking skills	*PSE*		*ELT*		*PME*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Developing students' self-respect	28	25.9	19	18.1	11	29.7	58	24.4
Being positive	4	3.7	4	3.8	1	2.7	9	3.8
Being a role model learner and thinker	23	21.3	31	29.5	8	21.6	62	26.1
Open to different opinions	43	39.8	44	41.9	13	35.1	88	37.0*
Listening to learners attentively	10	9.3	6	5.7	4	10.8	20	8.4
Other	0	0	1	1.0	0	0	1	0.4

Table 7 demonstrates that pre-service teachers consider that the most important attribute of teachers to the promoting thinking is to be open to different opinions (37%). Table 8 shows pre-service teachers' opinions on teachers' knowledge and skills, efficiency of course books and pre-service teachers' perceived self-efficacy levels in teaching thinking skills.

Table 8: Opinions on the levels of teachers' thinking skills knowledge (TS Knowledge), teachers' skills in teaching thinking skills (Skills in TTS), efficiency of course books (Efficiency of CB) and perceived self-efficacy in teaching thinking skills (Self-efficacy-TTS)

Department	*Items*	*Very low*		*Low*		*Medium*		*High*		*Very high*		*No idea*	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
PSE	TS knowledge	1	1.7	13	22.4	28	48.3	13	22.4	3	5.2	0	0
	Skills in TTS	2	3.4	14	23.7	30	50.8	11	18.6	2	3.4	0	0
	Efficiency of CB	4	6.8	14	23.7	23	39.0	14	23.7	1	1.7	3	5.1
	Self-efficacy-TTS	1	1.7	1	1.7	33	55.9	23	39.0	1	1.7	0	0
ELT	TS knowledge	3	5.6	12	22.2	28	51.9	11	20.4	0	0	0	0
	Skills in TTS	5	9.3	18	33.3	25	46.3	5	9.3	1	1.9	0	0
	Efficiency of CB	6	11.1	20	37.0	22	40.7	4	7.4	0	0	2	3.7
	Self-efficacy-TTS	0	0	7	13.0	35	64.8	11	20.4	1	1.9	0	0
PME	TS knowledge	0	0	5	23.8	4	19.0	11	52.4	1	4.8	0	0
	Skills in TTS	0	0	5	23.8	9	42.9	5	23.8	2	9.5	0	0
	Efficiency of CB	0	0	9	42.9	5	23.8	5	23.8	1	4.8	1	4.8
	Self-efficacy-TTS	1	4.8	0	0	10	47.6	9	42.9	1	4.8	0	0
Total	TS knowledge	4	3.0	30	22.6	60	45.1*	35	26.3	4	3.0	0	0
	Skills in TTS	7	5.2	37	27.6	64	47.8*	21	15.7	5	3.7	0	0
	Efficiency of CB	10	7.5	43	32.1	50	37.3*	23	17.2	2	1.5	6	4.5
	Self-efficacy-TTS	2	1.5	8	6.0	78	58.2*	43	32.1	3	2.2	0	0

Table 8 shows that 45.1% of pre-service teachers believe that field teachers' knowledge on thinking skills is in 'medium' level. 47.8% of them think that field teachers' skills in teaching thinking skills are in 'medium' level. 37.3% of them consider that efficiency of course books in teaching thinking skills is in 'medium' level and 58.2% of them perceive their self-efficacy in teaching thinking skills is in 'medium' level. Table 9 demonstrates the findings about pre-service teachers' training needs for teaching thinking skills in pre-service teacher education.

Table 9: Training need for teaching thinking skills in pre-service teacher education

Departments	*Item*	*Yes*		*No*		*Partially*	
		f	*%*	*f*	*%*	*f*	*%*
Pre-School Education	Training needs for TTS	32	54.2	12	20.3	15	25.4
English Language Teaching	Training needs for TTS	43	79.6	3	5.6	8	14.8
Primary Mathematics Edu.	Training needs for TTS	11	52.4	2	9.5	8	38.1
Total	Training needs for TTS	86	64.2*	17	12.7	31	23.1

As it can be seen in Table 9, 64.2% of pre-service teachers need training for teaching thinking skills in their teacher education process.

DISCUSSION

When the research results are taken into consideration, pre-service teachers seem to believe that thinking skills can be taught. Theoretical and empirical studies on thinking skills address that they are the mental activities which can be taught directly and systematically (Beyer, 2008b; Cotton, 1991; Fisher, 1999; Perkins, 1987; Smith, 2002). Within this scope, pre-service teachers' thoughts on the possibility of teaching thinking skills correspond to the findings in literature. As to majority of pre-service teachers, pre-school is the most appropriate level for teaching thinking skills. Fisher (1999) maintains that thinking skills should be directly taught and this instruction should begin as early as possible in order to ensure learners to think effectively. Akbıyık and Kalkan-Ay (2014) concluded in their study that pre-school teachers and administrators believe that thinking skills can be developed in pre-school stage. In this respect, findings of those studies can be said to be consistent.

Pre-service teachers indicate that the mixed approach is more appropriate in teaching thinking skills than the other approaches. Sternberg (1987) highlights that thinking skills should be taught both as a separate course and in the way of integration into curriculum. Various empirical studies also found out that the mixed approach is the most effective method in teaching critical thinking skills (Abrami, et al., 2008; Heijltjes, Van Gog & Paas, 2014). Therefore, this finding can be said to contribute to the related literature. Pre-service teachers participating in this study share the opinion that the most important attribute of teachers who promote thinking is 'being open to different opinions'. Critical thinking skills can be developed more effectively in the environments where different opinions are respected and different viewpoints are encouraged (McCall, 2011). Since teachers have leading roles in providing those environments for learners, it seems considerably significant that they possess that attribution. Furthermore, pre-service teachers think that the most important feature of a thinking-friendly classroom is 'teacher modeling in using effective thinking skills'. Similarly, they regard 'administrator and teacher modeling to learners in thinking skills' as the most significant feature of a thinking-friendly school. In conclusion, modeling is the most emphasized feature of a thinking-friendly classroom and school by pre-service teachers. Modeling is not only a teacher behavior promoting to develop thinking skills (Newmann, 1990), but also has a critical role in teaching thinking as a skill (Beyer, 2008a; Fisher, 1999; McGuinness, 1999).

Pre-service teachers believe that field teachers' knowledge and skills in teaching thinking skills, efficiency of course books in teaching thinking skills and their perceived self-efficacy in teaching thinking skills is in 'medium' level. Akbıyık and Kalkan-Ay (2014) found out in their study conducted with pre-school teachers that teachers perceive themselves incompetent in teaching thinking skills in a successful way. Similarly, Birbili (2013) notes that pre-school teachers have difficulty in encouraging children for higher-order thinking and asking open-ended questions. Whereas teachers perceive themselves incompetent, which is the finding of those studies in question, pre-service teachers are found to consider themselves partially competent in the present study. This difference can be said to arise from the instructional experiences of teachers

and pre-service teachers. On the other hand, in a study conducted by İnan and Özgen (2008) it was found that pre-service mathematics teachers perceive themselves highly competent in teaching thinking skills. That finding does not correspond to the finding obtained from the present study. This inconsistency can be thought to result from the differences in the teacher education process of the study groups. Çakır (2009) and Yüksel (2010) concluded in their studies conducted with mathematics teachers that teachers think that questions developing higher-order thinking skills are partially included in course books, yet it is not adequate for them. Despite the difference in study groups, the findings of those studies and the present study are similar in that sense.

The present study concludes that pre-service teachers perceive themselves partially competent in developing thinking skills in the future. Nevertheless, they feel that they need training for thinking skills. Harrison (2013) emphasizes that pre-service teachers need to acquire the essential skills for applying thinking skills in the classroom in teacher education period. When considering that pre-service teacher education programs need to meet the expectations of pre-service teachers for acquiring the skills necessary for teaching thinking skills (Alwehaibi, 2012), it can be said that several arrangements are needed in teacher education programs in order to meet the expectations for that need.

CONCLUSION

Results of the study indicate that pre-service teachers think that it is possible to teach thinking skills and thinking skills instruction should begin in pre-school years. They consider mixed approach which incorporates subject-based and skill-based approaches as the most effective approach in teaching thinking skills. Teachers and administrators who behave like a model in thinking skills are considerably important for a thinking-friendly classroom or school environment. Finally, pre-service teachers perceive themselves partially competent in developing thinking skills; nevertheless, they highlight the need for training in how to develop thinking skills at school.

When the results obtained from the present study are taken into consideration, it seems that raising awareness of pre-service teachers in teaching thinking skills is crucial. This can be achieved by integrating thinking skills into professional courses. Courses on teaching thinking skills should be included in teacher education programs and curricular arrangements should be made. Furthermore, pre-service teachers' thinking skills should be developed in the pre-service teacher education process.

REFERENCES

Abrami, P.C., Bernard, R.M., Borokhovski, E., Wade, A., Surkes, M.A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research, 78* (4): 1102-1134.

Akbıyık, C. & Kalkan-Ay, G. (2014). Okul öncesi yönetici ve öğretmenlerin düşünme becerilerinin öğretimine yönelik algıları: Bir durum çalışması. [Perceptions of pre-

school administrators and teachers on thinking skills ınstruction: A case study]. *Hacettepe University Journal of Education, 29* (1): 1-18.

Akınoğlu, O. (2001). *Eleştirel düşünme becerilerini temel alan fen bilgisi öğretiminin öğrenme ürünlerine etkisi* [*The effect of critical thinking skills based science education to learning outcomes]* (Unpublished doctoral dissertation). Hacettepe University, Graduate School of Social Sciences, Ankara.

Alwehaibi, H.U. (2012). A proposed program to develop teaching for thinking in pre-service English language teachers. *English Language Teaching, 5* (7): 53-63.

Beyer, B.K. (2008a). What research tells us about teaching thinking skills. *The Social Studies, 99* (5): 223-232. ERIC Number: EJ812510.

Beyer, B.K. (2008b). How to teach thinking skills in social studies and history. *The Social Studies, 99* (5): 196-201. ERIC Number: EJ812507.

Birbili, M. (2013). Developing young children's thinking skills in Greek early childhood classrooms: Curriculum and practice. *Early Child Development and Care, 183* (8): 1101-1114.

Bruin, W.B., Parker, A.M., & Fischhoff, B. (2007). Individual differences in adult decision-making competence. *Journal of Personality and Social Psychology, 92* (5): 938-956.

Burke, L. A., Williams, J. M., & Skinner, D. (2007). Teachers' perceptions of thinking skills in the primary curriculum. *Research in Education, 77*: 1-13.

Büyüköztürk, Ş. (2011).*Sosyal bilimler için veri analizi el kitabı. [Handbook for data analysis in social sciences]*. Ankara: Pegem Akademi.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education.* (6th Edition). London: Routledge.

Cote, D.L., Jones, V.L., Barnett, C., Pavelek, K., Nguyen, H., & Sparks, S.L. (2014). Teaching problem solving skills to elementary age students with autism. *Education and Training in Autism and Developmental Disabilities, 49* (2): 189-199.

Cotton, K. (1991). Close-Up # 11: Teaching thinking skills. *Northwest Regional Educational Laboratory's School Improvement Research Series*. http://educationnorthwest.org/sites/default/files/TeachingThinkingSkills.pdf Retrieved from September 25, 2015.

Çakır, İ. (2009). *İlköğretim beşinci sınıf matematik ders kitaplarının öğretmen ve öğrenci görüşleri doğrultusunda değerlendirilmesi [The evaluation of the fifth grade mathematics textbooks of the primary education according to the views of the teachers and students]* (Unpublished master thesis). Çukurova University Graduate School of Social Sciences, Adana.

Davies, D., Jindal-Snape, D., Collier, C., Digby, R., Hay, P., & Howe, A. (2013). Creative learning environments in education - A systematic literature review. *Thinking Skills and Creativity, 8*: 80-91.

De Bono, E. (1987). The direct teaching of thinking as a skill. M. Heiman & J. Slomianko (Eds.) *Thinking skills instruction: Concepts and techniques* (pp. 217-229). Washington DC: National Education Association.

Eggert, S., & Bögeholz, S. (2010). Students' use of decision-making strategies with regard to socioscientific issues: An application of the Rasch partial credit model. *Science Education*, *94* (2): 230–258.

Eggert, S., Ostermeyer, F., Hasselhorn, M., & Bögeholz, S. (2013). Socioscientific decision making in the science classroom: The effect of embedded metacognitive instructions on students' learning outcomes. *Education Research International*, *2013*: 1-12.

Eragamreddy, N. (2013). Teaching creative thinking skills. *International Journal of English Language & Translation Studies, 1* (2): 124-145.

Facione, P.A. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction* (The Delphi Report). Millbrae: California Academic Press.

Fisher, R. (1999). Thinking skills to thinking schools: Ways to develop children's thinking and learning. *Early Child Development and Care, 153* (1): 51-63.

Gregory, E., Hardiman, M., Yarmolinskaya, J., Rinne, L., & Limb, C. (2013). Building creative thinking in the classroom: From research to practice. *International Journal of Educational Research, 62*: 43–50.

Halpern, D.E. (1997*). Critical thinking across the curriculum. A brief edition of thought and knowledge.* New York, NY: Erlbaum.

Harrison, N. (2013). Using the interactive whiteboard to scaffold a metalanguage: Teaching higher order thinking skills in preservice teacher education. *Australasian Journal of Educational Technology,* 29 (1): 54-65.

Heijltjes, A., Van Gog, T., & Paas, F. (2014). Improving students' critical thinking: Empirical support for explicit instructions combined with practice. *Applied Cognitive Psychology, 28*: 518-530.

Hu, W., Adey, P., Jia, X., Liu, J., Zhang, L., Li, J., & Dong, X. (2011). Effects of a 'Learn to Think' intervention programme on primary school students. *British Journal of Educational Psychology, 81*: 531–557.

Hughes, C. (2014). Theory of knowledge aims, objectives and assessment criteria: An analysis of critical thinking descriptors. *Journal of Research in International Education*, *13*(1): 30–45.

İnan, C. & Özgen, K. (2008). Matematik öğretmen adaylarının öğretmenlik uygulaması sürecinde öğrencilere düşünme becerilerini kazandırmadaki yeterliliklerine yönelik görüşlerinin değerlendirilmesi. [Evaluation of mathematics teacher candidates' views towards efficiency in teaching thinking skills to students during the teaching training] *Electronic Journal of Social Sciences, 7* (25): 39-54.

Jackson, R.M. (1986). Thumbs up for the direct teaching of thinking skills. *Educational Leadership, 43*: 32-36.

Larson, L.C., & Miller, T.N. (2011). 21st century skills: Prepare students for the future. *Kappa Delta Pi Record, 47* (3): 121-123.

Lizarraga, M.L.S.A., Baquedano, M.T.S.A., & Cardelle-Elawar, M. (2007). Factors that affect decision making: Gender and age differences. *International Journal of Psychology and Psychological Therapy*, 7 (3): 381-391.

Marzano, R.J. (1993). How classroom teachers approach the teaching of thinking. *Theory into Practice,* 32 (3): 154-160.

Mayer, R.E. (1998). Cognitive, metacognitive, and motivational aspects of problem solving. *Instructional Science, 26*: 49-63.

McCall, A.L. (2011). Promoting critical thinking and inquiry through maps in elementary classrooms. *The Social Studies, 102* (3): 132-138. ERIC Number: EJ922448

McGuinness, C. (1999). *From thinking skills to thinking classrooms: A review and evaluation of approaches for developing pupils' thinking: Research Report No. 115* (Executive Summary). DIEE.

McTighe, J., & Schollenberger, J. (1991). Why teach thinking? A statement of rationale. A. L. Costa (Ed.), *Developing minds*: *A resource book for teaching thinking* (Revised Edition, Volume 1) (pp. 1-5). Alexandria, VA: Association for Supervision and Curriculum Development.

Newmann, F. M. (1990). Higher order thinking in teaching social studies. *Journal of Curriculum Studies, 22* (1): 41–56.

Pena, C., & Almaguer, I. (2012). The use of online discussions to foster critical thinking in a teacher education program. *International Journal of Instructional Media, 39* (1): 25-32.

Perkins, D.N. (1987). Knowledge as design: Teaching thinking through content. J. B. Baron & R. J. Sternberg (Eds.), *Teaching Thinking Skills: Theory and Practice* (pp. 62-85). New York, NY: WH Freeman/Times Books/Henry Holt & Co.

Ravitz, J., Hixson, N., English, M., & Mergendoller, J. (2012, April). Using project based learning to teach 21st century skills: Findings from a statewide initiative. *In American Educational Research Association Conference, Vancouver, Canada* (Vol. 16).

Serin, O. (2011). The effects of the computer-based instruction on the achievement and problem solving skills of the science and technology students. *The Turkish Online Journal of Educational Technology, 10* (1): 183-201.

Smith, G.F. (2002). Thinking skills: The question of generality. *Journal of Curriculum Studies, 34* (6): 659-678.

Sternberg, R.J. (1987). Questions and answers about nature and teaching thinking skills. J. B. Baron & R. J. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 251-259). New York, NY: WH Freeman/Times Books/Henry Holt & Co.

Torrance, E. P. (1962). Testing and creative talent. *Educational Leadership, 20*(1): 7-11.

Voogt, J., & Roblin, N.P. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies, 44* (3): 299-321.

Woodward, J., Carnine, D., & Gersten, R. (1988). Teaching problem solving through computer simulations. *American Educational Research Journal, 25* (1): 72-86.

Yang, S.C., & Chung, T.Y. (2009). Experimental study of teaching critical thinking in civic education in Taiwanese junior high school. *British Journal of Educational Psychology,79*: 29-55.

Yüksel, E. (2010). *İlköğretim 6.sınıf matematik ders kitaplarının öğretmen ve öğrenci görüşleri doğrultusunda değerlendirilmesi [The evaluation of the sixth grade mathematics textbooks of the primary education according to the views of the teachers and students]* (Unpublished master thesis). Çukurova University Graduate School of Social Sciences, Adana.

Zohar, A., & Schwartzer, N. (2005). Assessing teachers' pedagogical knowledge in the context of teaching higher order thinking. *International Journal of Science Education, 27* (13): 1595-1620.

Turkish Abstract
Öğretmen Adaylarının Düşünme Becerilerinin Öğretmi İle İlgili Görüşleri

Bu çalışmanın amacı öğretmen adaylarının düşünme becerilerinin öğretimi konsundaki düşüncelerini belirlemektir. İstanbul'da bir devlet okulunda İngilizce ve matematik öğretmenliği okuyan 134 son sınıf öğrencisi çalışmaya katılmış ve çalışma tarama modelinde desenlenmiştir. Araştırmacılar tarafından geliştirilen bir ölçek veri toplamada kullanılmış ve veri analizi için yüzdelik ve frekans analizleri yapılmıştır. Sonuçlar bu öğretmen adaylarının düşünme becerilerinin öğretilebildiğini ve okul öncesi dönemde öğretilmeye başlanması gerektiğini düşündüklerini ortaya koymaktadır. Ayrıca düşünme becerilerini öğretmede en etkili yaklaşımın karma yaklaşım olduğunu öğretmen adayları belirtmişlerdir. Düşünme dostu sınıflar ve okullar için öğretmenlerin ve yöneticilerin model olmasının oldukça önemli olduğu da düşünülmektedir. Öğretmen adayları ayrıca düşünmeyi destekleyen öğretmenin en önemli özelliğinin farklı fikirlere açık olma olduğuna inanmaktadırlar. Bu öğretmen adayları gelecekte öğrencilerin düşünme becerilerini geliştirmede kısmen kendilerini yeterli görmektedirler. Ancak, okullarda bu eğitimi vermek için eğitim gerektiğini vurgulamışlardır.

Anahtar Kelimeler: düşünme becerileri, eğitim programları ve öğretim, düşünme becerilerinin öğretimi, eleştirel düşünme, yaratıcı düşünme

French Abstract
Les opinions de pré-service des enseignants sur les compétences de réflexion pédagogique

Le but de la présente étude est de déterminer les opinions des enseignants pré-service sur l'enseignement des habiletés de pensée. 134 pré-service de pré-école supérieure, en anglais et de mathématiques qui étudient dans une université d'Etat à Istanbul ont été participé à l'étude qui est conçue selon le modèle de l'enquête. Un questionnaire qui a été développé par les chercheurs a été utilisé dans la collecte de données et le pourcentage et les valeurs de fréquence ont été calculées pour l'analyse de données. Les résultats ont montré que les professeurs de pré service ont pensé que des compétences pensantes pourraient être enseigné et enseignant des compétences pensantes devrait commencer dans le niveau d'école maternelle. Ils ont considéré l'approche mixte comme l'approche la plus efficace dans l'enseignement de compétences pensant. Ils ont considéré que le modelage des professeurs et administrateurs était considérablement important dans des salles de classe favorables à pensée et des écoles. Ils ont cru qu'étant ouvert aux avis différents était l'attribut le plus important des professeurs qui promeuvent la pensée. Les professeurs de pré service se perçoivent partiellement compétents dans le développement des compétences de pensée des étudiants dans l'avenir. Cependant, ils ont souligné le besoin de recevoir une formation dans l'enseignement de compétences pensantes aux écoles.

Mots Clés: en pensant compétences, programme d'études et instruction, enseignant compétences pensant, pensée critique, pensée créative

Arabic Abstract

الآراء المعلمين ما قبل خدمة على تدريس مهارات التفكير

والغرض من هذه الدراسة هو تحديد آراء المعلمين قبل الخدمة على تعليم مهارات التفكير. ، وشارك 134 من كبار قبل الخدمة ما قبل المدرسة الإنجليزية والرياضيات الذين يدرسون في جامعة الدولة في اسطنبول في الدراسة التي تم تصميمها بناء على نموذج المسح. تم استخدام الاستبيان الذي تم تطويره من قبل الباحثين في مجال جمع البيانات ونسبة وتردد القيم حسبت لتحليل البيانات. وأظهرت النتائج أن المعلمين قبل الخدمة يعتقد أن مهارات التفكير يمكن أن تدرس وأن تعليم مهارات التفكير تبدأ في مرحلة ما قبل المدرسة. اعتبروه نهج مختلط باعتبارها النهج الأكثر فعالية في تعليم مهارات التفكير. واعتبروا أن النمذجة المعلمين والإداريين مهم إلى حد كبير في فصول دراسية ملائمة التفكيروالمدارس. إنهم يعتقدون أن الانفتاح على وجهات نظر مختلفة كانت السمة الأكثر أهمية من المعلمين الذين يروجون التفكير. أدرك المعلمون قبل الخدمة لأنفسهم المختصة جزئيا في تنمية مهارات التفكير لدى الطلاب في المستقبل. ومع ذلك، شددوا على الحاجة إلى التدريب في تعليم مهارات التفكير في المدارس.

كلمات البحث: مهارات التفكير، المناهج وطرق التدريس، تدريس مهارات التفكير، والتفكير الناقد، والتفكير الإبداعي

German Abstract
Die Meinungen der Pre-Service Lehrer auf Denkfähigkeiten Lehre

Der Zweck der vorliegenden Studie ist es Meinungen von Pre-Service-Lehrer unterrichten Denkfähigkeiten zu bestimmen. 134 leitender Pre-Service-Kindergarten, Englisch und Mathematik Lehrer an einer staatlichen Universität in Istanbul studierten an der Studie teilgenommen, die auf Erhebungsmodell basiert ausgelegt ist. Ein Fragebogen, der von den Forschern entwickelt wurde, wurde in der Datenerfassung und der Prozentsatz und Frequenzwerte wurden verwendet, um für die Datenanalyse berechnet. Die Ergebnisse zeigten, dass Pre-Service-Lehrer gedacht, dass das Denken Fertigkeiten vermittelt und Fähigkeiten Lehre Denken werden

könnten, sollten in Vorschulalter beginnen. Sie betrachteten den gemischten Ansatz als die effektivste Ansatz im Denken Fähigkeiten zu lehren. Sie vertraten die Auffassung, dass Lehrer und Administrator-Modellierung im Denken freundliche Klassenzimmer und Schulen deutlich wichtig war. Sie glaubten, dass an unterschiedliche Meinungen offen zu sein, war das wichtigste Attribut der Lehrer, die Denken fördern. Pre-Service-Lehrer sehen sich bei der Entwicklung der Schüler Denkfähigkeiten in Zukunft teilweise kompetent. Allerdings betonten sie die Notwendigkeit für die Ausbildung in Denkfähigkeiten an Schulen zu unterrichten.

Schlüsselwörter: denkfähigkeiten, lehrplan und unterricht, lehre denkfähigkeiten, kritisches denken, kreatives denken

Malaysian Abstract
Pendapat Guru Pra Perkhidmatan mengenai Pengajaran Kemahiran Berfikir

Tujuan kajian ini adalah untuk menentukan pendapat guru-guru pra-perkhidmatan terhadap pengajaran kemahiran berfikir. 134 guru kanan pra-perkhidmatan pra-sekolah, bahasa Inggeris dan matematik yang sedang belajar di sebuah universiti negeri di Istanbul telah terlibat dalam kajian ini yang direka berdasarkan model tinjauan. Satu set soal selidik yang telah dibangunkan oleh para penyelidik telah digunakan dalam pengumpulan data dan peratusan dan kekerapan nilai telah dikira untuk analisis data. Satu set soal selidik yang telah dibangunkan oleh para penyelidik yang telah digunakan dalam pengumpulan data dan peratusan serta kekerapan nilai telah dikira untuk analisis data. Hasil kajian menunjukkan guru-guru pra perkhidmatan menyangka bahawa kemahiran berfikir boleh diajar dan pengajaran kemahiran berfikir pengajaran harus bermula pada peringkat pra-sekolah. Mereka menganggap pendekatan campuran sebagai pendekatan yang paling berkesan dalam pengajaran kemahiran berfikir. Mereka menganggap bahawa guru dan pentadbir adalah sebagai model dalam mewujudkan kemahiran berfikir yang mesra bilik darjah dan sekolah. Mereka percaya bahawa menjadi terbuka kepada pendapat yang berbeza adalah sifat yang paling penting guru-guru yang menggalakkan pemikiran. Mereka percaya bahawa keterbukaan kepada pendapat yang berbeza adalah sifat yang paling penting guru-guru yang menggalakkan kemahiran berfikir. Guru-guru pra perkhidmatan melihat diri mereka sebahagiannya kompeten dalam membangunkan kemahiran berfikir pelajar pada masa hadapan. Walau bagaimanapun, mereka menekankan keperluan latihan dalam pengajaran kemahiran berfikir di sekolah-sekolah.

Kata Kunci: kemahiran berfikir, kurikulum dan pengajaran, pengajaran kemahiran berfikir, pemikiran kritikal, pemikiran kreatif