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The relationship between higher order thinking skills and critical thinking of gifted talented students

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Abstract: The aim of this research is to examine the relationship between higher order thinking skills and critical thinking of gifted talented students, as well as the opinions of teachers who are teaching gifted talented students about the transfer of higher order thinking skills from curriculum to the gifted talented students. Mixed method was used in the research. In the first phase of the research, a study was conducted to measure the relationship between students' thinking skills and critical thinking. In the second stage, interview questions were prepared and applied to the teachers with reference to the items to be measured for qualitative research. As a result of the correlation made to investigate the relationship between higher thinking skills and critical thinking; positively significant correlations were found between the gifted students' ability to acquire knowledge, to apply knowledge, and to use knowledge, which are sub-dimensions of higher order thinking skills in general. Interview method was used for qualitative data in the study. As a result of qualitative research, the advantages and disadvantages of reflections of critical thinking skills on educational programs, evaluations of applied critical thinking skills in order to see the projections in the program, and the method techniques used to reach the goals.

Keywords: higher order thinking skills; critical thinking; gifted talented students.

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1 Introduction

In the ancient Greek philosophy of thinking which the historical starting point was; the thinking structure of Socrates, the founder of critical thought is; in-depth inquiry with a sceptical approach in the process leading to the definite right of knowledge, and the coherence of ideas between them (Nails, 2010). Should schools teach children how to think in schools that provides the strengthening of individual life aspects? Should we not think of teaching and learning as a natural consequence? Can the individual realise how to think without being taught of thinking? The answers to these questions that are important in the treatment of thinking are to be found. We are realising how this process is going to take place when we perform the tasks of classifying, analysing, integrating with other information, using analogy techniques for better comprehension, reaching scientific findings, organising information, making hypothesis, decision making and problem solving. We are actually thinking without the way of thinking is not taught to us (Nagappan, 1998). Before the skills necessary for thinking have gained function; definition of thinking should be done. But these definitions are more difficult to do than seemed as. Sigel (1984) defined "thinking is a definition we often use, but we can not define it exactly". These processes appear to be in two general types, cognitive and meta-cognitive definitions were defined (Eisenman, 1995).

Due to the rapid changes in science and technology, the global challenges of the 21st century have the necessity of a change in education. It has been demanded that the training to be provided by the change is focused on the competence of the individuals. The teachers who will provide this training should prepare the university students to think so as to provide the requested changes. The changes to be made in education should reflect the subjects that include global topics in each course. At this point, globalisation can be seen as a threat or opportunity (Kao, 2008). This is a situation that will transform this situation into a step-by-step approach to a higher order thinking of skills (Richard, 2010).

As children grow and develop, thinking up to a certain level occurs naturally. It is emphasised that in this level of student learning, the quality of thought is increased by the teachers and more effective thinking can be achieved. This includes skills such as thinking deep, consistent and more productive which aimed at increasing the quality of thinking. It is not only literacy competence that should be given to the students but also that they can look at a topic with a critical eye. In order to be able to adapt to the

emerging technology age, it is necessary to gradually reach the complexity of thinking skills from the sub-steps. Nagappan (2000) stated that in these thinking stages, knowledge must first be memorised. Brady (2008) stated the same idea by emphasising the importance of memorising knowledge in the development of comprehensive thinking skills in order to be able to analyse the complex issues of life. The findings obtained against the social changes between different generations support the views defended. In order to adapt to the continuously evolving world, it is necessary to solve higher order thinking skills and complexity (Crews, 2010).

'Higher order thinking skills' are used for many purposes, including on-the-job training and psychological fieldwork. Cognitive methods in these areas include topics such as problem solving, synthesis, analysis, evaluation, metacognition, causal relation or logical conclusion, abstraction, independent thinking, creative and critical thinking. Expressing this term, Vygotsky (1978) stated that while the child is developing intellectually, he can make progress by using higher-order thinking skills in solving problems by carrying out more complex mental operations. Piaget defined the effort to reach the end or the product by consolidating the curiosity, the desire to find cause, the independent thinking and the knowledge he had already acquired in his book of *Understanding is the Inventing: The Future of Education*, deals with higher order thinking skills (Harrington, 2014).

Newman (1990) emphasises that higher order thinker should develop by selecting different ways of thinking in the face of difficulties and to be able to lead against these difficulties. Difficulty is the ability to use one's mind by interpreting, analysing, or manipulating information in the resulting data, which is the problem that is always tried to solve in the same way. With this opportunity, the individual must have been able to go beyond the information he or she has already learned (Darlington, 1999).

2 Critical thinking

Critical thinking is a mental method that aims to use many thinking skills. It is a higher order thinking skill that is achieved by first assessing the hypothesis that the hypothesis is established by observing, experiencing or other intellectual processes (Scriven and Paul, 1987).

Critical thinking includes the work done in many areas. These areas are; study of cognitive and behavioural psychology, higher education, philosophy, and health (Bailin, 1993; Gambrill, 2005; Hurd, 2004; Patel and Bean, 2007; Stanovich and Stanovich, 2010). When critical thinking definitions are made, it is not possible to reach a conclusion with the opinions of the employees in these fields. Although many disciplines have come together to try to unite at a point of definition, they have not been concluded because they also cover different disciplines. According to Willingham, (2007), critical thinking is intertwined with other forms of thinking such as analytical, creative, reflective, meta-cognition, and is said to have no limits at the point of distinguishing them from each other. In fact, critical thinking on a subject is created by entering into the limits of other forms of thinking (Coffman, 2013).

Philosophy and psychology, which are quite different in their own fields and have a wide range of topics they deal with, have made a concerted effort in the field of assessment or problem-solving of critical thinking (Quellmalz, 1987). Philosophy uses

criticism to define accepted or unthinkable thoughts and develops appropriate criteria for their use. Skills are applied by using disciplines without thinking critically, at which point there is a tendency to look at ideas by focusing on misconceptions or non-logical consequences. On the contrary, psychology uses the tools that theoretically need to be addressed by looking at methods of thinking, methods, and strategies (Quellmalz, 1987; Resnick, 1987; Voss et al., 1991). Critical thinking determines properties to a certain degree by taking advantage of the common features of both psychology and philosophy. French and Rhoder (1992) defines critical thinking as an attempt to achieve a critical result from general impressions in the form of deduction, focusing on a subject and reasoning with analysis (Gruberman, 2005).

Critical thinking is classified as high-order thinking skills due to recalling, problem-solving from creative cognitive processes, creative thinking, latent learning, and decision-making processes as opposed to dreaming in daily life (Sparapani, 2000). It is difficult to describe critical thinking by distinguishing it from definitions used for other higher order thinking skills. Presseisen (2001, p.123) defines problem solving as 'difficult-to-identify or known-for-solving' when distinguishing higher order thinking skills. Creative thinking is the use of basic thinking processes to develop novel, architectural, constructive ideas or products, or discover innovations in this way. Ennis (1996) defines criticism as the decision to choose the best answer from many of the choices presented and to decide what to believe or will do in the course of the discovery or solution (Burkhart, 2006). The importance of critical thinking in education has been acknowledged in recent years. With all thinking skills, critical thinking seems to be a skill that is often discussed and known. Critical thought begins with Socrates, but the American philosopher, psychologist and educator John Dewey is seen as the father of the tradition of modern critical thinking. He described it as active, persistent and careful thinking in the form of a belief or hypothesis, according to the reasons supporting it and the other conclusions that propensity it (Sampedro and Hillyard, 2004). This definition means that he will provide his/her teaching without passive, without waiting for the students to be taught by someone. They are conscious of the learning process and are aware of the change that comes to them. They try to ask themselves questions, identify their problems, find strengths and weaknesses, access the information they are interested in, and plan their own learning (Demir, 2008). In this context, the research investigates the relationship between higher order thinking skills and critical thinking of gifted talented students and their opinions on transferring high-order thinking skills from instructional programs of teachers who are trained to gifted talented students.

3 Method

Mixed method was used in this research. Accordingly, quantitative and qualitative data were obtained in the direction of the research objectives. In the related field, it appears that the mixed method is defined in similar forms. A common definition for these definitions is that the hybrid method is defined as a research model in which both quantitative and qualitative data are collected and analysed simultaneously or sequentially (Christensen et al., 2014; Creswell, 2005; Fraenkel et al., 2011; Gay et al., 2009; Tashakkori and Teddlie, 2003).

3.1 Research group

The study group consists of 312 gifted talented students, 140 girls and 172 boys aged between 10 and 16, in the education year of 2016–2017, Sakarya BİLSEM, Balıkesir BİLSEM, Giresun BİLSEM and TÜZYEKSAV School in Ankara. The mean age of the sample is 12.4.

3.2 Measurement tool

3.2.1 Higher thinking skills scale

In order to measure the participants' upper level thinking skills, the scale of the higher thinking skills developed by Saido et al. (2015) was used adapted to Turkish by the researcher. This self-assessed scale was used as a paper-pencil test. The student chooses the information on the basis of a 5-point Likert rating, by selecting one of the most appropriate numbers for himself/herself. Participants mark these items for (1) – never, (2) – rarely, (3) – sometimes, (4) – often and (5) – always. The 35 items constituting the scale consists of three sub-dimensions. These sub-dimensions are; gaining knowledge (sample items; teacher encourages us to ask questions), applying knowledge (teacher helps me reach the solution), using knowledge (teacher allows us to interpret scientific events through observation). The reliability coefficient for Turkish culture is .93. Reliability coefficients of subscales of the scale; knowledge gained .89, knowledge application .85, knowledge use .76. The item total correlation coefficients of the population vary between .26 and .64. The confirmatory factor analysis of the scale found that the fit indices were appropriate (x2 = 1,099.38, sd = 523, p = .00, RMSEA = .060, normed fit index (NFI) = 0.94, non-normed fit index the relative fit index (CFI) was 0.97, the incremental fit index (IFI) was 0.97, and the relative fit index (RFI) was 0.94. There is no reverse scoring material in the scale. The scale gives the total score. As scores from the scale increase, the individual's upper-level thinking skills increase.

3.2.2 Critical thinking scale

A scale was used to measure the tendency of the talented students in the study to think critically, developed by Sosu (2013). Akın et al.'s critical thinking tendency scale. This scale is implemented as a paper pencil test and assesses the participants' own situation. Participating students are most likely to score a 1–5 number of Likert grades 1–5. Explanation of each item: (1) – absolutely disagree, (2) – disagree, (3) – undecided, (4) – participate and (5) – definitely agree.

The critical thinking tendency scale consists of 11 items and two sub-dimensions. Reflective scepticism from sub-dimensions consists of seven items, critical aperture consists of four items (e.g., 'I think about wide/widespread effects that will often cause meltdown before moving'). The factor loadings of EDFS varied between .68 and .75 and the total correlation varied between .25 and .57. There is no reverse scoring material in the scale. The scale gives the total score. As the scores of the scale increase, the individual's critical thinking ability increases.

3.3 Process

The permission for students to participate in the study was taken from the relevant institutions and the students and teachers voluntarily participated in the research. Completion of scales and qualitative questions ensures that the privacy policy is guaranteed. The scale was applied in groups to the students in the classroom. Before the implementation of scales and qualitative questions, the aims of researching all participants were explained. Quantitative analysis, Pearson correlation coefficient and structural equation modelling were used. Qualitative data were analysed with descriptive content analysis method.

Quantitative analyses were performed with LISREL 8.54 (Joreskog and Sorbom, 1996) and SPSS 21.

4 Findings

4.1 Study 1

4.1.1 Descriptive findings

The difference between the mean scores of the students with gifted talents and the general thinking and subscale scores of high thinking skills were not statistically significant (P = 0.116, critical thinking tendency = 0.135, p > 0.05). The averages, standard deviations, mutual correlation and internal consistency coefficients of the variables used in the research are given in Table 1.

Table 1 Descriptive statistics and relational findings

	ho1	*ho2*	*ho3*	*ED1*	*ED2*	*Mean*	*Std. deviation*
ho1	1	.708**	.730**	.341**	.315**	58.8	8.60843
ho2	.708**	1	.724**	.323**	.321**	37.8	5.7
ho3	.730**	.724**	1	.304**	.355**	49.5	7.3
ED1	.341**	.323**	.304**	1	.609**	26.8	4.8
ED2	.315**	.321**	.355**	.609**	1	15.5	2.8

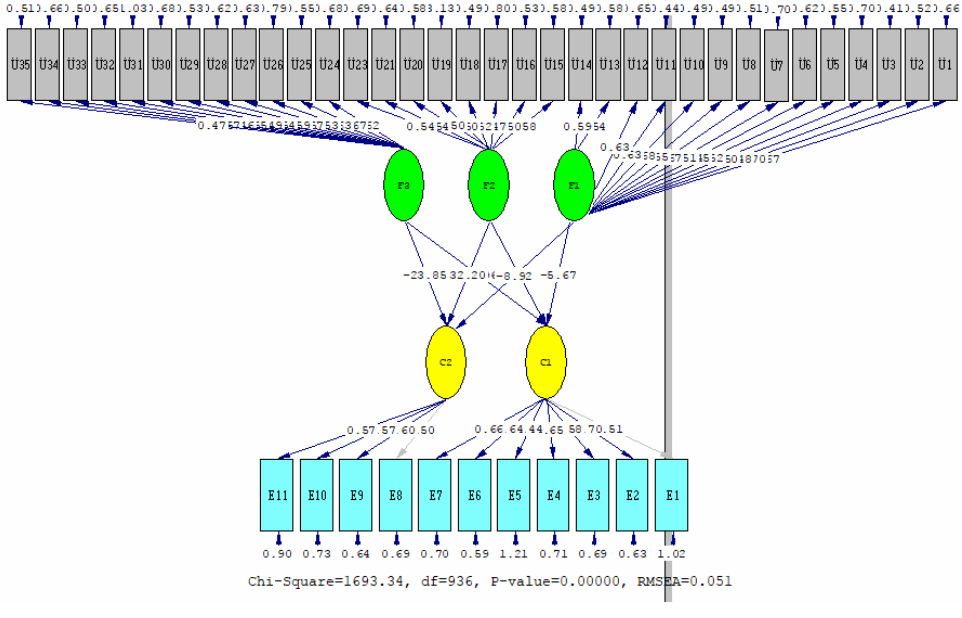
Notes: **Correlation is significant at the 0.01 level (2-tailed).
Ho – higher order thinking scale: Subscale: ho1 – acquiring the knowledge, ho2 – applying knowledge,ho3 – reflection on knowledge. Critical thinking Subscale: Ed1 – critical openness, Ed2 – reflective scepticism.

When Table 1 is examined, it appears that there is a significant relationship between critical thinking and high-level thinking. There is a positive correlation between the total scores of students' critical thinking and high level thinking skills at .39 level. There is a positive relationship between higher order thinking sub-dimensions and critical thinking sub-dimensions. Critical openness (r = .34) and reflective skepticism (r = .31) were positively related in the acquiring the knowledge sub-dimension. Critical openness (r = .32) and reflective scepticism (r = .32) were positively related to information application sub-dimension. Critical openness (r = .30) and reflective scepticism (r = .35) were positively related to the reflection on knowledge subscale.

4.1.2 Structural equation modelling

Hypothesis model was examined by structural equation modelling (SEM). According to this model, critical thinking is explained by three dimensions of high-level thinking skills. Figure 1 shows the results of the structural equation modelling analysis using the maximum likelihood estimates. The structural equation model showed a perfect fit [x2 = 1,693.34, df = 936, p = .00, RMSEA = .051, NFI = 0.92, NNFI = 0.96, parsimony normed fit index comparative fit index (CFI) = 0.96, incremental fit index (IFI) = 0.96, relative fit index (RFI) = 0.92, standardised RMR = 0.054].

Figure 1 Structural equation modelling (critical thinking and high-level thinking skills) (see online version for colours)



4.2 Study 2

4.2.1 Findings about qualitative work in terms of transfer of higher thinking skills to gifted talented students

Content analysis has been included in order to examine the opinions of teachers on teaching programs in order to make more effective applications in the education of gifted talented students. The data are organised in terms of overall appearance. The data were analysed, meaningful relations were found, temporary categories, themes were formed. The codes and main themes were determined by means of the data obtained from the opinions of the people who were consulted. Subsequent data are organised according to these basic intermediate codes. Explanations and interpretations are given by giving direct citation. When the teachers' views of the characteristics of the superiority of the training programs prepared for the gifted talented students were examined, they stated that the personal skills and the predictive capacities were higher and they had higher cognitive, emotional and psychomotor behaviours than their peers.

4.2.2 Findings related to features to be considered in teaching programs prepared for teachers of highly talented students

When Table 2 is examined, it is stated that the students' personal differences and the effects of their interests shape the program by at most 38.09% of the opinions of the teachers regarding the features of the gifted students' programs. The other opinions are that 28.57% of the students have a high level of understanding and comprehension, and 23.80% are creativity and productivity.

Table 2 Students' personal differences

THEME (category)	*Codes*	*f*	*%*
General features	Individual differences and areas of interest (K1, K2, K3, K4, K8, K9, K10, K12)	8	38.09
	High levels of grip and comprehension (K6, K7, K8, K12, K16, K21)	6	28.57
	Creativity, productivity features (K2, K4, K6, K7, K12,	5	23.80
	Personal skills, thoughts and individual skills (K6, K15, K16, K17, K19,	5	23.80
	The interest in research and knowledge (K10, K12, K20, K21)	4	19.04
	Capacity assessment events (K6, K12, K14, K21)	4	19.04
	Should be at the top level according to their age (K15, K16, K18)	3	14.28
	Different psychological and personality traits (K11, K13)	2	9.52
	Attention times (K20, K21)	2	9.52
	Age, gender characteristics (K3, K8)	2	9.52
	Leadership features (K6)	1	4.76

Below is a list of individual statements from the teachers' views.

> "Individual differences should be considered. An open classroom environment should be established for solutions to new ideas. I try to make them aware of their talents and their creativity." (K2)

> "We attach importance to creativity, individual differences, productivity, communication skills and group work." (K4)

Assessment methods applied to search the reflection of the educational programs on the top related findings.

The opinions on the evaluation methods applied to see the reflection of the teachers' applied education programs to gifted students are presented in Table 3.

When Table 3 is examined, it is seen that the use of techniques such as observation form, rubrik, self-evaluation, meaning analysis table, diagnostic tree, diagnostic tree, is 28.57% and 23.80% of the information about the evaluation methods applied to see the reflection of the teachers' project or performance criterion.

Teachers stated that 52.40% of the adequacy of evaluation methods is insufficient and they should be developed.

Table 3 The opinions on the evaluation methods applied

Theme (category)	*Codes*	*f*	*%*
Evaluating methods	(K2, K3, K7, K15, K16, K18), and the alternative evaluation methods (observation form, rubrik, self evaluation, peer assessment, structured grid, interpretation table, diagnostic tree, station ...)	6	28.57
	Project, performance (K1, K2, K3, K9, K21)	5	23.80
	With unit evaluation questions (K8, K10, K11, K14)	4	19.04
	Open-ended questions (K8, K20)	2	9.52
	Working with groups (K4, K12)	2	9.52
	Discussion (K15, K18)	2	9.52
	Article preparation (K9, K21)	2	9.52
	Problem solving techniques (K13)	1	4.76
Suffeciency status	Insufficient. (K1, K2, K5, K6, K7, K9, K14, K17, K19, K20, K21)	11	52.40
	Sufficient. (K3, K4, K8, K10, K11, K12, K13, K15, K16, K18)	11	47.60

Below is a list of individual statements from the teachers' views.

> "Standardized success tests, performance and product evaluation are among the evaluation methods used in the portfolio. I do not see enough of it that individual differences and talents need to be more comprehensive in their training programs to be evaluated in the performance-oriented process." (K2)

> "Research assignments or projects. Rather than providing information to students, it is necessary to encourage research and sharing. The checklists of the in-group activities should be kept regular and the views of the student himself / herself and his / her advisor should be kept in mind during the learning process and feedback should be provided." (K4)

4.2.3 Findings on the effects of teachers' ability to give high-level thinking in the implementation of the program to talented individuals

Table 4 presents the opinions of teachers about what might be influenced by future of being talent in critical thinking education, where gifted students gain skills such as independent thinking, questioning, questioning the reliability of information resources, comparing different opinions.

When Table 4 is examined, it is emphasised that up to 57.21% of high-order thinking skills will develop in the opinions of teachers about the effects to be given to gifted individuals to give critical thinking to the educational programs they apply. In addition, 28.57% stated that scientific literacy will be improved and event will be attained by observing, experimenting, questioning and researching.

Below is a list of individual statements from the teachers' views.

> "The greatest benefit of critical thinking to superior talents is to create creative ideas by producing new ideas. Advancing on the path to becoming a scientist is the right way to go for sophisticated students who use high-level thinking skills

for the societies and even for the development of the world because they arrive more quickly when they leave." (K2)

"We now see these effects in our students at universities. It seems that academicians have special qualities that are remarkable in project preparation, communication skills, group work, scientific research and reporting." (K3)

Table 4 Opinions of teachers about the effects of providing critical thinking in the program implementation process to talented individuals

Theme (category)	*Codes*	*f*	*%*
Opinions	Development of high-level thinking skills (K1, K2, K4, K5, K10, K11, K12, K14, K15, K18, K19, K21)	12	57.21
	The development of science literacy (K3, K4, K9, K12, K16, K21)	6	28.57
	Training of individuals contributing to national development (K2, K12, K15, K17, K18)	5	23.80
	Increased self-esteem (K1, K11, K13, K21)	4	19.04
	The development of decision making skills (K1, K11, K13, K21)	4	19.04
	Preparation of academic document (K3)	1	4.76
	Selection of occupational fields appropriate to their abilities	1	4.76

5 Conclusions, discussion and suggestions

The aim of this research is to examine the relationship between higher order thinking skills and critical thinking of talented students in according to the opinions of the teachers who give trainings to gifted talented students, about the transferring of higher order thinking skills from curriculum to gifted talented students.

There is a significant positive correlation between higher thinking skills and critical thinking of gifted talented students. As higher order thinking skills scores of gifted talented students increase, critical clarity, reflective scepticism and critical thinking tendencies, which are sub-dimensions of critical thinking, also increases. In addition, the tendency of critical talent of gifted talented students and higher order thinking ability general and subscale point averages were compared, and the difference between gender averages was not statistically significant. When the field literature is searched, topics such as analytical, creative, critical thinking, problem solving skills are found which are considered in higher order thinking skills. In addition, there was no research on gifted talented students in terms of both their higher order thinking skills and their tendency to think critically.

As a result of the research, there is a positive relationship between the higher order thinking sub-dimensions and the critical thinking sub-dimensions. Critical openness (r = .34) and reflective scepticism (r = .31) were positively related in the acquiring the knowledge sub-dimension. Critical openness (r = .32) and reflective scepticism (r = .32) were positively related to information application sub-dimension. Critical openness (r = .30) and reflective scepticism (r = .35) were positively related to the reflection on knowledge subscale. Hypothesis model was also examined by structural equation

modelling (YEM). According to this model, critical thinking is explained by three dimensions of higher order thinking skills. (x2 = 1,693.34, df = 936, p = .00, RMSEA = .051; SRMR = 0.054). It is seen that the correlation between the higher order thinking subscale and the critical thinking reveals the theoretical relationship between the whole and its sub-dimensions. When studies are examined, national and international studies in support of the findings of the research are highlighted.

It requires students in the constructivist learning environment to examine topics from multiple perspectives, collect information, synthesise, discuss and defend them. Throughout the course, teachers should direct their students to higher order thinking and critical thinking and problem solving activities around social events or in the process of encountering a future problem. Students participate in these activities are given the opportunity to use critical thinking skills and problem solving strategies. In this context, Heong et al. (2011) and Marzona (2001) emphasise that higher order thinking skills in students' academic and daily life relationships are moderate and should be developed with the method of evaluating higher order thinking skills. Çakır (2013) emphasised that the individuals participating in the study as a result of the study were moderate in their analytical thinking, problem solving skills, and higher order critical thinking skills. Kızıltaş (2011) stated that there is no significant difference in terms of systematicity, while the search for truth found in sub-factors of critical thinking is different in favour of male teacher candidates in terms of self-confidence. Money (1997) investigated the impact of critical thinking outcomes on academic achievement scores in Canada. In this research, gender, age and second language were examined in terms of variables. As a result, there was no difference in gender critical thinking scores. In addition, Allison (1993) pointed out that there were no gender differences in the students who applied to the critical thinking/problem-solving program in which there were three, four, fifth grade students in the study. In the literature, these studies support the findings of our research.

Another sub-problem that is included in the study is; teachers' views on the creation and implementation of curriculum prepared for gifted talented students. According to the results obtained in the study; teachers, when describing gifted talented individuals, they point out that their individual differences are manifest, that their interests are not the same as others, and that they have a high level of understanding and creativity. The positive aspects of critical thinking from the higher order thinking skills to the teachers in order to be able to respond to the needs and innovations they bring to the teaching curriculum; to develop multifaceted thinking skills, to develop creative, reflective thinking, to provide information to the living. The negative side of this; the controversy in the discussions made, the limited time in practice, and the lack of compliance with all the issues. In the literary space there are suggested opinions which support the opinions of the teachers and suggested. Delisle (1991) emphasises that gifted talented individuals have features such as critical thinking, researching, non-acceptance of facts, sense of leadership, judgement and judgement in many aspects, and productive. Beldağ and Keskin (2016) evaluated the views of gifted talented students in their study titled 'Teacher's opinions about the values of students in science and art center and other schools'. This study has pointed out that self-confidence, accuracy values of gifted talented individuals. Özyaprak (2016) stated that the mathematical thinking potential of the students will be improved, different solutions will be tried, new ideas will be obtained by discussing, and also critical thinking point and increasing of problem solving capacities and high higher order thinking his skills will increase. Also; In the Connerly

(2006) study, a program was used to use critical thinking skills with a gifted talented student studying in the fourth grade. The purpose of its implementation is; to be able to look at events consistently and impartially as individuals believe freely, fluently, by linking. The conclusion drawn here is that gifted talented children will also gain other thinking skills by teaching critical thinking skills.

According to the findings obtained from the research; it is stated that the skills of higher order thinking and the tendency of critical thinking are related to each other. It is worth noting that by identifying this pathway, higher-order thinking skills and critical thinking should be more important in training for gifted talented students. It is necessary for the academicians and teachers who work in these fields to come together and share ideas in the workshops in order for the institutions providing training for the gifted talented students to meet in the common payday and apply the same training programs. The contents of the materials used for the education of these students (source books, coding education, robot design, mind games, course tools, etc.) should be made accessible, reflecting the present conditions. Gifted talented students are the neglected part of other groups in the field of special education. More schools are needed to create equal opportunities for them. There are several limitations of this study that should be taken into account when interpreting the results. A purposeful sample was used in the study, and therefore there are well-known common method biases that may have influenced the findings. The extent to which these findings are generalisable beyond the current sample is unclear. More studies focusing on samples from different racial/ethnic populations and different socio-economic levels are needed. Also, as with any relational study, the direction of causation is unclear. Qualitative studies and data to be obtained from different sample groups are included in the recommendations for future studies.

References

Allison, A. (1993) *Critical Thinking/Problem Solving Skills for the At-Risk Student*, Northern Arizona University, Arizona.

Bailin, S. (1993) 'Epilogue: problems in conceptualizing good thinking', *American Behavioral Scientist*, Vol. 37, pp.156–164.

Beldağ, A. and Keskin, S. (2016) 'Bilim ve sanat merkezlerinde ve diğer okullarda öğrenim gören öğrencilerin sahip oldukları değerlere ilişkin öğretmen görüşleri', *Kırıkkale Üniversitesi Sosyal Bilimler Dergisi*, Vol. 6, No. 1.

Brady, M. (2008) 'Cover the material – or teach students to think?', *Educational Leadership*, Vol. 65, No. 5, pp.64–67.

Burkhart, M.L. (2006) *Thinking Critically about Critical Thinking: Developing Thinking Skills among High School Students*, Claremont Graduate University, California.

Çakır, N. (2013) *Üniversite eğitiminin üst düzey düşünme becerilerinin gelişimine etkisi*, Hacettepe University, Ankara.

Christensen, L.B., Johnson, R.B. and Turner, L.A. (2014) *Research Methods, Design, and Analysis*, Pearson.

Coffman M.D. (2013) *Thinking about Thinking: An Exploration of Preservice Teachers' Views about Higher Order Thinking Skills*, University of Kansas, Kansas.

Connerly, D. (2006) *Teaching Critical Thinking Skills to Fourth Primary Teaching Students Identified as Gifted and Talented*, Graceland University, Iowa.

Creswell, J.W. (2005) *Educational Research: Planning, Conducting, And Evaluating Quantitative and Qualitative Research*, 2. Baskı, Pearson Education Inc., USA.

Crews, F.C. (2010) *The Effects of Using Bloom's Taxonomy to Align Reading Instruction with the Virginia Standards of Learning Framework for English*, Yayınlanmış Doktora Tezi, The Faculty of the School of Education Liberty University.

Darlington, K. (1999) *The Impact of Culturally Relevant Strategic Teaching on the Higher Order Thinking Skills of Spanish-Speaking Bilingual High School Students*, Boston University School of Education, Boston.

Delisle, R. (1991) 'Gifted students and social studies', in Shaver, J.P. (Ed.): *Handbook of Research on Social Studies Teaching and Learning Içinde*, McMillan Publishing Company, New York.

Demir, K. (2008) 'Transformational leadership and collective efficacy: the moderating roles of collaborative culture and teachers' self-efficacy', *Eurasian Journal of Educational Research*, Vol. 33, pp.93–112.

Eisenman, J.G. (1995) *An Evaluation of the Higher Order Thinking Skills Program with Fourth and Fifth Grade Students*, The University of Georgia, Athens, GA.

Ennis, R. (1996). *Critical Thinking*, Prentice Hall, Upper Saddle River, NJ.

Fraenkel, J.R., Wallen, N.E. and Hyun, H.H. (2011) *How to Design and Evaluate Research in Education*, 8th ed., McGraw Hill, New York.

French, J.N. and Rhoder, C. (1992) *Teaching Thinking Skills: Theory and Practice*, Garland Publishing, Inc., New York.

Gambrill, E. (2005) *Critical Thinking in Clinical Practice: Improving the Quality of Judgments and Decisions*, 2nd ed., John Wiley & Sons, Inc., Hoboken, NJ.

Gay, L.R., Mills, G.E. and Airasian, P. (2009) *Educational Research Competencies for Analysis and Applications*, Pearson, Columbus.

Gruberman, R.S. (2005) *Teacher Conceptualizations of Higher-Order Thinking: A Case Study*, Boston College Lynch Graduate School of Education, Boston.

Harrington, M.A. (2014) *Middle School English Language Arts Teachers' Knowledge and Beliefs Relative to Higher Order Thinking*, Hofstra University, Hempstead, New York.

Heong, Y. M., Yunos, J., Hassan, R., Othman, W. and Kiong, T.T (2011) 'The perception of level of higher order thinking skills among technical education students', *2011 International Conference on Social Science and Humanity IPEDR. 5*, IACSIT, Singapore.

Hurd, P. (2004) *The State of Critical Thinking Today: The Need for a Substantive Concept of Critical Thinking*, Foundation for Critical Thinking, Santa Barbara.

Joreskog, K.G. and Sorbom, D. (1996) *LISREL8: User's Reference Guide*, Scientific Software, Mooresville.

Kao, J. (2008) 'The rise of other nations', *Stanford Social Innovation Review*, Vol. 6, No. 4, p.24.

Kızıltaş, Y. (2011) *Sınıf öğretmeni adaylarının ve sınıf öğretmenlerinin eleştirel düşünme eğilimlerinin çeşitli değişkenler açısından incelenmesi: Van ili örneği*, Yüzüncü Yıl Üniversitesi.

Marzano, R. (2001) *Designing a New Taxonomy of Educational Objectives*, Corwin Press, Thousand Oaks, CA.

Money, S.M. (1997) 'The relationship between critical thinking scores, achievement scores and grade point average in three different disciplines', *Academic Research Library*, Vol. 197, No. 63.

Nagappan, R. (1998) *Teaching Higher-Order Thinking Skills in Languages Classrooms: The Need for Transformation of Teaching Practice*, Michigan State University, Michigan.

Nagappan, R. (2000) 'Language teaching and the enhancement of higher order thinking skills', Paper presented at the *Southeast Asian Ministers of Education Organization Regional Language Centre' 35th International Seminar*, April, Singapore.

Nails, D. (2010) 'Socrates', in Zalta, E.N. (Eds.): *The Stanford Encyclopedia of Philosophy* [online] https://plato.stanford.edu/archives/spr2010/entries/socrates/ (accessed 20 April 2017).

Newmann, F.M. (1990) 'Higher order thinking in teaching social studies: a rationale for the assessment of classroom thoughtfulness', *J. Curric. Stud*., Vol. 22, No. 1, pp.41–56.

Özyaprak, M. (2016) 'Üstün zekâlı ve yetenekli öğrenciler için matematik müfredatının farklılaştırılması', *Hasan Ali Yücel Eğitim Fakültesi Dergisi*, Vol. 13, No. 25, pp.115–128.

Patel, L. and Bean, T.W. (2007) *Critical Literacy: Context, Research, and Practice in the K-12 Classroom*, Sage Publications, Thousand Oaks, CA.

Presseisen, B. (2001) 'Thinking skills: meanings and models revisited', *Developing Minds: A Resource Book for Teaching Thinking*, Association for Supervision and Curriculum Development, USA.

Quellmalz, E.S. (1987) 'Developing reasoning skills', in Baron, J.B. and Sternberg, R.J. (Eds.): *Teaching Thinking Skills: Theory and Practice*, pp.86–105, W.H. Freeman and Companyc.

Resnick, L.B. (1987) *Education and Learning to Think*, National Academy Press, Washington, DC.

Richard, B. C. (2010) *The Evaluation of Reflective Learning Practice: Preparing College Students for Globalization*, Northcentral University, Prescott Valley, Arizona.

Saido, A.M.G., Siraj, S., Nordin, A.B. and Al-Amedy, O.S. (2015) 'Teaching strategies for promoting higher order thinking skills: a case of secondary science teachers', *Malaysian Online Journal of Educational Management*, Vol. 3, No. 4, pp.16–30.

Sampedro, R. and Hillyard, H. (2004). *Global Issues*, Oxford University Press, Oxford.

Scriven, M. and Paul, R. (1987) 'Defining critical thinking', *8th Annual International Conference on Critical Thinking and Education Reform* [online] http://www.criticalthinking.org/pages/defining-critical-thinking/766.

Sigel, I.E. (1984) 'A constructivist perspective for teaching thinking', *Educational Leadership*, Vol. 42, No. 3, pp.18–21.

Sosu, E.M. (2013) 'The development and psychometric validation of a critical thinking disposition scale', *Thinking Skills and Creativity*, Vol. 9, pp.107–119, https://doi.org/10.1016/j.tsc.2012.09.002.

Sparapani, E.F. (2000) 'The effect of teaching for higher-level thinking. An analysis of teacher reactions', *Education*, Vol. 121, No. 1, pp.80–89.

Stanovich, K. and Stanovich, P. (2010) 'A framework for critical thinking, rational thinking, and intelligence*',* in Preiss, D. and Sternberg, R. (Eds.): *Innovation in Educational Psychology: Perspectives on Learning, Teaching and Human Development*, pp.195–238, Springer Publishing Company, New York, NY.

Tashakkori, A. and Teddlie, C. (2003) *Handbook of Mixed Methods in Social and Behavioral Research*, Thousand Oaks: Sage.

Voss, J.F., Perkins, D.N. and Segal, J.W. (1991) *Informal Reasoning and Education*, Erlbaum, Hillsdale, NJ.

Vygotsky, L. (1978) *Mind in Society: The Development of Higher Psychological Processes*, Harvard University Press, Cambridge, MA.

Willingham, D. (2007) 'Critical thinking: why is it so hard to teach?', *American Educator*, Vol. 31, pp.8–19.