Research Article

The Effect of Multiple Intelligences on Academic Achievement: A Meta-Analytic and Thematic Study[*]

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Abstract

In this study, the effect of multiple intelligence theory (MIT) on the academic achievement was examined in the context of a multi-complementary approach (McA). It aimed to reach pre-complementary information by using meta-analytical and thematic examinations based on document analysis in the first stage of McA, which consists of using different analysis programs and of three basic stages. 63 studies examining the effect of the MIT were selected for meta-analytical research. Comprehensive Meta-Analysis and MetaWin programs were used for data analysis. In order to support the meta-analysis, a qualitative dimension including a detailed examination of the thematic aspects of the data was added to the first stage. The data was analyzed via the QSR-Nvivo-8.0 program in accordance with the case study design. In the second stage of the McA, an experimental dimension and the thematic analysis based on students' views were conducted. The working group was selected from 12th grade high school students and the data obtained from them was considered to be post-complementary information. The process of combining the data in two stages was done in order to reach complementary information in the synthesis stage. The McA is expected to contribute to the extent and reliability of the research.

Keywords

Multiple intelligence theory • Academic achievement • Multi-complementary approach • Meta-analytic and thematic analysis • Student

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Gardner (1983) introduced multiple intelligence theory (MIT) for the first time in his book, *Frames of Mind* (Trujillo, 2002). His work benefitted from the use of a variety of studies' experimental findings. Although he made use of psychometric and experimental psychology, his studies were not just limited to those disciplines. On the contrary, cognitive and developmental psychology, differential psychology, neuroscience, anthropology and cultural studies were also included in MIT studies. Gardner defined intelligence as producing valuable products in a culture, and characterized it as a potential biopsychology helping to process data, which can be activated in a cultural context to solve problems (Gardner & Moran, 2006). However, a number of definitions concerning intelligence have since been developed. One definition of intelligence states that it is not directly observable, concrete and fulfilled, but rather it can be observed through behaviors and is a complex structure that affects our daily and future behaviors (Johnson, 2013). Intelligence is also defined as being able to be discovered, adapted and formed, and has an ability to select context (Sternberg, 2014). Thus, it should be noted that intelligence is continuously in interaction with real life circumstances (Taylor, 2007).

Gardner's studies in MIT have had a profound impact, particularly on educational frameworks. During its years of early development, the theory was regarded as a solution to issues of learning in schools. In particular, classes, instruction programs and schools were reconstructed in the context of this theory (Gardner, 2005). However, as the curriculum of schools in these early years focused solely on verbal-linguistic intelligence and logical-mathematical intelligence, it should be kept in mind that those who were successful in those areas of intelligence were regarded as being intelligent and successful (Castejon, Perez, & Gilar, 2010; Harriman, 2010; Trevino, 2005). Gardner noticed this shortcoming and noted that information could be obtained about individuals' success in schools through standard IQ tests (Mussen, 2007). However, IQ is not an appropriate scale to obtain information about how successful an individual will be in life; it is also not a valid or accurate predictor of an individual's future (Babelan & Moenikia, 2010) because an IQ point just means the calculated values used to compare individuals' aptitudes with a society's representative sample (Gomez, 2009). Thus, MIT had a tremendous impact in 1983, and it has been used widely since then (Pack, 2011).

According to MIT, humans have seven different intelligences, namely verbal-linguistic, logical-mathematical, visual-spatial, musical-rhythmic, interpersonal, intrapersonal and bodily-kinesthetic (Gardner, 1986). However, Gardner has continued to develop his theory and has since added new intelligences, such as naturalist intelligence (Trujillo, 2002) and existential intelligence (Akbari & Hosseini, 2008) to his theory. One of the elements that enabled Gardner in constructing MIT was his examination of children and his understanding that each child had a different

skill. Some were good at logical computation and others were good at verbal-linguistic or musical-rhythmic aspects. Under these circumstances, Gardner posited that intelligence was multifaceted, taking into account the fact that each human had definite intelligence/s, similar to having a definite personality (Gardner, 1998). Thus, it can be said that students learn an issue via different means, different intelligence areas and different senses, and in different circumstances through MIT (Kuo, Maker, Su, & Hu, 2010; Maddox, 2002). In the research carried out in this study, the success rates of schools where all teachers used MIT in six different education levels were used. It was seen in the evaluations carried out following MIT implementation that the success rates increased substantially every year, and consequently the theory had a positive impact on students' achievement performances (Harriman, 2010).

Whilst there are many supporters of MIT, a number of criticisms have been leveled against the theory. The use of Gardner's intelligence areas in the teaching process can be thought to place a burden on teachers (Gardner, 2000). Klein (1997) has stated that his criticism of the theory is that it is too broad in scope; therefore, it cannot be used in curricula. He has also indicated that the definitions with regards to some intelligence types are not very clear. He questions the theory's logic that emphasizes that the reason a dancer dances well depends on his/her musical-rhythmic intelligence and that the question of what musical-rhythmic intelligence means is answered by an ability to dance well (as cited in Al-Wadi, 2011). However, it is known that there is widespread use of MIT in schools despite the criticisms outlined above.

The Aim and Significance of the Study

There are a number of studies showing that schools' widespread use of MIT as a learning and teaching model, across many different disciplines produces successful results (Akkuzu & Akçay, 2011; Chan, 2007; Furnham, 2001; Stanciu, Orban, & Bocoş, 2011). When the literature review of these studies and the research results are examined, it can be seen that MIT presents a wide range of models and helps teachers reach more students in their class by providing a variety of methods. It can be argued that the rich teaching materials used in teaching processes will be reasonably effective in revealing the different personal interests, needs and abilities of the students, and in giving them the basis of the learning-teaching process in the class to a most efficient and high degree. However, it was concluded that the studies accessed through the literature review were one-dimensional. Thus, it was decided to examine the related theory in a more detailed way via the use of the multi-complementary approach (McA), which is thought to make a contribution to the literature. In other words, it is preferable to use McA with the aim of reaching comprehensive, valid and reliable results by using various statistical programs and combining both qualitative and quantitative results within the framework of an interdisciplinary understanding (Batdı, 2016).

A multi-complementary approach consists essentially of three stages. In the first stage in this study, the current situation of MIT in the scientific literature was examined, and it tried to identify whether there is a deficiency of certain dimensions of the related subject, i.e. MIT. The achievement of thematic data based on document analysis at this stage is entirely to strengthen the meta-analytic findings and to provide data diversity. Meta-analytic and thematic data have been described as the pre-complementary information of the study. In the second stage, a study based on an experimental design was planned in order to address the deficiency in the first stage. Then, a working group was chosen from the experimental group and their views were collected to obtain thematic data. The main purpose here was to support the experimental data and to ensure the richness of the findings. The data obtained in this second stage is called the post-complementary information. The final stage of the study includes achieving the holistic information by synthesizing all the data obtained in the first and second stages. Therefore, findings obtained from different data/data sources and analyzed with different analysis programs were integrated under one roof and comprehensive and valid results acquired. The McA, which includes all this extensive process, was expected to provide significant contributions to the field and attract more interest from researchers to be used widely in their future research. The following sub-objectives are hereby determined within the scope of examining the effect of MIT on academic achievement through McA: i) to achieve pre-complementary data in the first study stage; a) finding the extent of the effect of MIT on academic achievement in the context of a meta-analytic review based on documentary analysis, b) determining the effect of using MIT on academic achievement in the context of meta-analytic review based on thematic analysis; ii) to obtain post-complementary data in the second study stage; a) calculating whether there is a significant difference between the post-test scores of the experimental and control group related to the use of MIT in English lessons, b) identifying the effect of using MIT on academic achievement in terms of students' views; iii) to obtain complementary data in the third study stage, a) determining whether pre- and post-complementary data, obtained in the first and second stage, is complementary and their synthesis is integrative.

Method

The current study, which aimed to determine the effect of MIT on academic achievement, was conducted by applying an approach called McA, which is defined as an approach based on combining qualitative and quantitative results and using different analysis programs (SPSS, MetaWin, CMA, Nvivo, Maxqda, etc.) within the context of a holistic approach so as to assure comprehensive, valid results (Batdı, 2016). The study was carried out in three stages: pre-complementary, post-complementary and complementary information. In the first stage, studies conducted

on MIT were scanned through document analysis (meta-analytical and thematic) and the deficiency at this point was determined, in which process the achieved information was called pre-complementary information. The meta-analytic method was used in this process, which is either a statistical technique to combine the findings of independent studies dealing with the same issue (Crombie & Davies, 2009) or can be defined as a statistical combination of studies (Cooper, 1998). The researcher attempted to include all studies of MIT carried out between 2000 and 2016 at national and international levels. For this purpose, the key words "multiple intelligences" were searched for within ProQuest Dissertations and Theses (PQDT), the Higher Education Council National Thesis and Dissertation Center, Google Scholar, Ebscohost-Eric, Ebscohost-Professional Development Collection and ScienceDirect search engines. As a result of the literature review, 63 studies were selected out of 220 theses and 680 articles using the selection criteria of the study. The meta-analytic method includes steps such as examining theoretical relationships amongst study results, examining studies to collect data, coding studies, calculating effect size (ES), interpreting results and analyzing their distribution and their effect according to variables and reporting (DeCoster, 2004). The Comprehensive Meta-Analysis (CMA) statistical program and the MetaWin program were used in statistical computations while the classification levels formulated by Cohen (1992) were used to calculate the effect size in this research. The reliability outcome was carried out according to the inter-rater reliability calculation and the reliability outcome was found to be 100%. In the context of McA, it was decided that a thematic analysis concerning MIT should be conducted in order to provide data richness in the first stage of the study. For this purpose, the detailed examination of 12 studies concerned with MIT at national and international levels were analyzed through content analysis using the QSR NVivo 8.0 program. In addition, the documents containing the themes and codes in the text were also coded. The articles were encoded with the letter of "A", while theses were coded "T". Also, numbers were used next to the letters for the coding. When the related study was shown in the text, the page numbers on which the relevant citation has been made were also indicated (e.g., "T97p.7" (cited from the thesis enumerated as 97 on the 7th page). In terms of reliability, the agreement values (Cohen Kappa) amongst data coders were calculated and found to be between .611 and 1.000, which means a "good /very good agreement".

It was aimed to carry out an experimental study in the second stage in order to address the deficiency of the research, which is determined by pre-complementary information. As there was no study related to MIT conducted with 12th grade high school students, and there was a limited number of studies applied to foreign language courses, MIT was applied to a 12th grade high school foreign language course through a pretest-posttest controlled group experimental design in order to reach post-complementary knowledge in an experimental dimension. The

experimental study group consisted of 180 students selected from among 12th grade students at Anatolian High School, Elazığ, during the 2014-2015 academic year. The neutral assignment of the students was achieved through cluster analysis. In the first semester of the 2014-2015 academic year, a 25-question achievement test, whose validity and reliability was provided by a TAP program, was prepared according to Bloom's taxonomy indicator. The related achievement test was implemented on the 12th grade experimental and control groups. Data were analyzed via the SPSS-17 program using pretest and posttest scores. The average difficulty of the achievement test was calculated to be .420 while the KR-20 reliability coefficient was .868.

In the second stage of the McA based study, it was also decided to conduct a qualitative dimension with a view to contributing to the research scope, reliability and data enrichment by means of collecting post-complementary information via different data. The related dimension was carried out considering action research design in which data was analyzed through content analysis. As the working group of the study, 24 students from across three different levels of achievement, "$Low_{(L)}$, $Medium_{(M)}$, $Good_{(G)}$", were selected among the experimental and control group according to the maximum variation sampling. When quotations from students are directly cited in the text, the quoted student is coded (e.g., 11M-F: a male student with a medium academic level enumerated as 11). The students' opinions collected through a semi-structured interview form were analyzed via the Maxqda-11 program and the agreement values were calculated. In order to ensure the validity and reliability of the qualitative dimension of the research, it was considered that the themes and sub-themes should be integrated with each other in terms of their consistency and meaningfulness. In this way, it may be possible to ensure the consistency of the findings at the internal validity point, and the findings should be supported by different data sources (Miles & Huberman, 1994). For the external validity of the study, all the treatments concerning the pattern, data collection tool, collection and analysis of the data were explained in detail and the researcher kept research data, analysis and codes secured. On the other hand, for the internal reliability of the study, the data obtained was presented in its original form without any comment. The comments of the researcher were enriched by direct quotations (LeCompte & Goetz, 1982). In addition, for the data analysis, the themes and related sub-themes were formed considering the theoretical structure. As another reliability step, inter-rater reliability (Cohen Kappa), which is a value to find the correspondence between two data encoders in the analysis process, was calculated. The inter-rater reliability of the current study was found to be between .703 and .757, which means "a good agreement" (Viera & Garrett, 2005). At the point of external reliability, the process of the data collection, of the data analysis and of how the results were related and presented (LeCompte & Goetz, 1982; Miles & Huberman, 1994) were presented in detail in the relevant sections of the study.

In the final stage of the McA designed study, the case of synthesis emerges. At this stage, pre-complementary (meta-analytical and thematic findings) and post-complementary information (experimental and thematic findings) related to MIT was combined in the conclusion section to provide a complete presentation of the research. Combining findings that were collected from different sources, and which were analyzed through different statistical programs, has been considered the most fundamental result of the research.

Results

This section includes the results obtained from the first and second stages of the McA-based study. Within the context of pre-complementary data, meta-analytical and thematic analysis based on documentary analysis were presented and interpreted, while post-complementary data, experimental findings and thematic findings were based on participants' views. When the findings are examined, it will be seen that the pre- and post-complementary data are integrative and supportive.

Meta-Analytical Results Related to Pre-Complementary Data

In this section of the research, the descriptive information concerning the meta-analytic studies is given. The calculated effect size values and the difference for each group in the sub-categories are examined. As the statistical significance level of the studies is 0.05, the significance level of the research is determined as 0.05. When all the population sizes in these studies are grouped together, the experimental group consists of 1835 students and the control group comprises 1784 students.

The general effect size findings concerning academic achievement in the meta-analysis are given in Table 1. The standard error was .035 and the upper limit for 95% of the confidence interval was .973, the lower limit was .837 and the effect size was .905, positive and significant based on the calculations for fixed effects model (FEM) (see Table 1). When the statistical significance was calculated according to the z-test, it was found to be 25.993 (*p* = .000). As a result of the homogenous test, the Q statistical value occurred at 234.301. However, in the 95% significance level from the χ2 table, the approximate critical value of 81.38 and 62 degrees of freedom were found. As the Q statistical homogenous test value for the 63 studies in the analysis according to FEM exceeded the critical value in χ2 with 62 degrees of freedom, the homogenous FEM in relation to the distribution of the effect sizes was declined. In other words, the distribution of the effect sizes according to FEM was determined to be heterogeneous. In parallel with the Q statistical homogenous test value significance, the effect size change was seen to be bigger than the change occurring from sampling error (Lipsey & Wilson, 2001).

Table 1

The Distribution of Homogeneous Values, Average Effect Sizes and Confidence Intervals for the Studies Included in the Meta-analysis Based on the Effect Models

Type of Model	n	Z	*p*	Q	ES	SE	95% Confidence interval	
							Lower Limit	Upper Limit
FEM	63	25.99	.00	234.30	0.90	0.035	0.837	0.973
REM	63	13.93	.329	66.52	0.95	0.068	0.816	1.084

Note. df:62.

As seen in Table 1, as the distribution in the research was heterogeneous, the effect of teaching, which includes teaching with and without MIT, was compared according to the random effects model (REM). The standard error was .068 and the upper limit for 95% of the confidence interval was 1.084, the lower limit was .816 and the effect size was .950, based on the calculations for REM. The effect size value was in the large effect size according to Cohen's (1992) classification. According to this finding, it can be said that teaching with MIT has a positive effect on students' academic achievements. When the statistical significance was calculated according to the z-test, it was found to be 13.930 (p = .32913). The Q statistical homogenous test value for the 63 studies according to REM was calculated as 66.522. In the 95% significance level from the χ2 table, the critical value 81.38 and 62 degrees of freedom were found. As the Q statistical homogenous test value did not exceed the critical value in χ2 with 62 degrees of freedom, the homogeneity in relation to the distribution of the effect sizes according to REM was accepted. In other words, the distribution of the effect sizes according to REM can be said to be homogeneous.

The Effect of the Studies Examining MIT in relation to Education Level

The studies were separated into four different groups (primary school, secondary school, high school and university) in order to investigate the total effect sizes of the studies including teaching with MIT in relation to educational levels. The analysis results are given in Table 2. When the effect of the theory on the students' academic achievements in relation to educational levels was analyzed, the highest effect size of 1.139 was in the primary school group and the lowest effect size of .708 was in the high school group. The total effect size for the groups occurred at .934. In other

Table 2

The Effect of the Studies Based On MIT in Regards to Education Level

Education levels	N	ES	% 95 Confidence interval		Effect Size Level
			Lower limit	Upper limit	
Primary school	10	1.139	0.711	1.567	Large
Lower secondary school	39	0.974	0.822	1.127	Large
High School	11	0.708	0.321	1.095	Medium
University	3	0.816	0.522	1.111	Large
Total	63	0.934	0.811	1.056	Large

Q_B = 3.080, Z = 14.950, df = 3, p = .380.

words, MIT can be said to have a large effect size on all educational levels with the exception of the high school group (effect size level=medium).

When the homogenous test for the inter groups based on the analysis results in Table 2 were examined, the Q_B value occurred at 3.080. In the 95% significance level from the χ2 table, the value for 3 degrees of freedom was 7.815 ($χ2_{(0.95)} = 7.815$). As the Q_B statistical value ($Q_B = 3.080$) with 3 degrees of freedom was lower than the critical value in χ2 ($χ2_{(0.95)} = 7.815$), this value can be said to have a homogeneous distribution. The studies were grouped according to educational levels. When the effect size ($Q_B = 3.080$, $p = .380$) of the inter groups were considered, it could be seen that there were not significant differences amongst the inter groups. This result shows that academic achievement in the lessons where teaching is carried out using MIT does not change according to education level.

The Effect of the Studies Examining MIT Regarding Subject Area

The lessons were separated into five different groups to investigate the total effect sizes of the meta-analytic studies, including the teaching with MIT in relation to subject area. The lessons were as follows: *Science* (Physics, Biology, Chemistry, Science Education, Science and Technology), *Mathematics*, *Social Sciences* (Social Sciences, Geography, Turkish, Citizenship and Human Rights Education, Life Sciences, Social Sciences, Music, Visual Arts, Revolution History and Kemalism, Religious Culture and Moral Knowledge), *Foreign Language* (English) and *Others* (Undergraduate lessons: Biology and Physics). The results of the analysis are given in Table 3. When the effect of the theory on the students' academic achievements in relation to subject area was analyzed, the lowest effect sizes were in foreign language and science education ($ES_{foreign\ language}$: 0.458; $ES_{science}$: 0.785). However, the other groups had a large effect size (ES_{Total}: 0.935) on the total effect size.

Table 3
The Effect of the Studies with MIT in Regards to Subject Area

Subject area	N	ES	95% Confidence interval		Effect Size Level
			Lower Limit	Upper Limit	
Science	25	0.785	0.566	1.003	Medium
Mathematics	15	1.092	0.816	1.368	Large
Social Sciences	17	1.178	0.949	1.407	Large
Foreign Language	3	0.458	-0.012	0.927	Small
Others	3	0.816	0.512	1.111	Large
Total	63	0.935	0.815	1.055	Large

$Q_B = 11.986$, $Z = 15.246$, df = 4, $p = .017$.

When the homogenous test for the inter groups in Table 3 was examined, the Q_B value was seen to occur at 11.986. In the 95% significance level from the χ2 table, the value for 4 degrees of freedom was found at 9.488 ($χ2_{(0.95)} = 9.488$). As the homogeneous

value (Q_B = 11.986) with 4 degrees of freedom was more than the critical value ($\chi2_{(0.95)}$ = 9.488) in $\chi2$ distribution, it can be said to have a heterogeneous distribution. Based on this, the studies were grouped according to the subject areas. When the effect size (Q_B = 11.986, p = .017) of the inter groups were considered, it can be stated that there was a significant difference amongst the inter groups. However, it can be noted that this only provides information about the current situation rather than providing a definite judgment; this is due to the limited studies complying with the criteria in regards to foreign language and the other groups including undergraduate lessons.

The Effect of the Studies Examining MIT Regarding the Teaching Period

The studies were separated into five different groups (2-4, 5-6, 7-8, 9-18 weeks and a non-specified teaching period) in order to investigate the total effect sizes of the meta-analytic studies including teaching with MIT in a given teaching period. The results of the analysis for this group are given in Table 4. Where the effect of the theory on the students' academic achievements in each teaching period is concerned (Table 4), the highest effect size of 1.232 was in the 7-8 week period and the lowest effect size of 0.857 in the 2-4 week period. It is understood that all the groups had large effect sizes.

Table 4
The effect of the studies based on MIT in regards to the teaching period

Implementation period (Week)	N	ES	95% Confidence interval		Effect Size Level
			Lower limit	Upper limit	
2-4	27	0.857	0.658	1.056	Large
5-6	12	0.930	0.643	1.216	Large
7-8	7	1.232	0.945	1.518	Large
9-18	5	1.083	0.781	1.385	Large
Not specified	12	0.954	0.553	1.356	Large
Total	63	0.985	0.863	1.107	Large

Q_B = 4.997, Z = 15.770, df = 4, p = .288.

When the homogenous test for the inter groups in Table 4 was examined, the Q_B value was found to be 4.997. In the 95% significance level from the $\chi2$ table, the value for 4 degrees of freedom was indicated as 9.488. As the Q_B statistical value with 4 degrees of freedom was lower than the critical value ($\chi2_{(0.95)}$ = 9.488) in $\chi2$ distribution, the homogeneous hypothesis concerning the effect size distribution based on the FEM was accepted. In other words, it was found that the effect of MIT on students' academic achievement in terms of the teaching period did not differ significantly (Z = 15.770, p = .288). This finding shows that the academic achievement points obtained from the lessons carried out with MIT did not change depending on the teaching period. Therefore, it can be seen that teaching with MIT had a large effect on all groups.
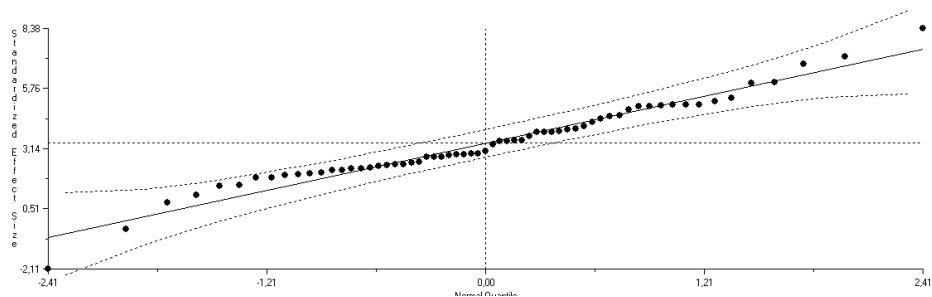
Figure 1. Normal quantile plot.

In Figure 1, the normal quantile plot, which reflects whether the effect sizes of the included studies are relevant to normal distribution, is seen. When the distribution (seen as bold points) is between the two lines, the study can be stated to be in the confidence interval (Rosenberg, Adams, & Gurevitch, 2000). In Figure 1 above, the distribution is between the two lines, which means there is a normal and confident interval. Thus it can be inferred that studies are statistically related.

Thematic Results Based on Documentary Analysis Related to Pre-Complementary Data

Thematic results are presented in a variety of themes/codes under certain models in order to achieve pre-complementary information by the addition of a thematic aspect to the meta-analysis. This section of the study, thus, aimed to identify the effect of teaching with MIT on the academic achievement of students through examining national and international studies. Therefore, the participants' responses to MIT were examined using document analysis of the studies. The responses were categorized into theme and sub-theme models in relation to the effectiveness of MIT, the difficulties encountered in its implementation and the distribution of MIT areas.

The positives and negatives of teaching with MIT. The participants' responses to teaching with MIT were obtained through a detailed examination of the written documents. The analysis under the main theme "The Positives and Negatives of Teaching with MIT" consisted of six different themes, including positive and negative responses towards thinking skills, evaluation and measures, teaching and activities, lesson plans and the relationship between duty, responsibility awareness and learning. These themes and sub-themes are presented in Figure 2. The model, which was constructed through a combination of the themes and sub-themes presented in Figure 2, along with the joint text, which was formulated using the reference sentences, are presented below.
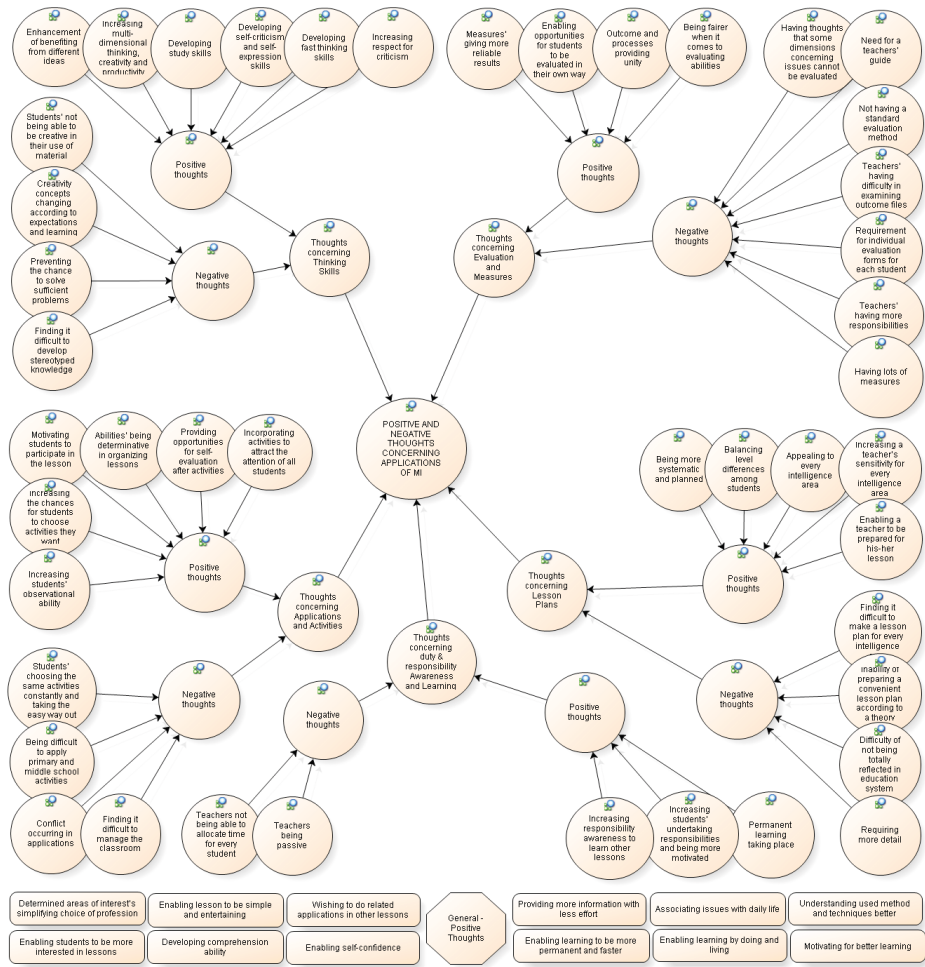
Figure 2. The positives and negatives of teaching with MIT.

The responses to teaching with MIT were gathered under the heading, "General-Positive Thoughts". In this context, the statement from the M3$_{p.51}$ coded study, "*presented examples enable us to understand better and we learn faster [...] we, indeed, learnt this lesson so easily and in an entertaining way*", is understood to be a reference for the sub-theme "enabling lessons to be simple and entertaining". The other sub-themes, "enabling learning to be more permanent and faster" and "providing more information with less effort" concerning the general and positive thoughts for the theory is supported by a quotation from the T99$_{p.55}$ coded study, i.e. it *"makes teaching easy for us after enabling it to be faster and more effective."* In addition to the positive attitudes towards lesson plans using MIT, the practice is "appealing to every intelligence area", "balances level differences amongst students" and "enables a teacher to be prepared for his/her lesson". However, there were also

several negative responses to the theory, such as the "difficulty of not being totally reflected in the education system" and the "inability to prepare a convenient lesson plan according to a theory". A quotation from the T99$_{p.54}$ coded study, "*I cannot prepare appropriate lesson plan[s] for MIT. Up to now, we even have had difficulty in finding material*", was used as an example of the negative responses. When the positive and negative response themes for teaching and activities were examined, the sub-theme "motivating students to participate in the lesson" was supported with a quotation from the M7$_{p.1349}$ coded study: "*As Turkish lessons are directed towards reading, comprehension, interpretation and writing, these features are being carried out with MIT easily and students are taking opportunities to participate in lessons thoroughl*y". On the other hand, sub-themes concerning negative responses towards teaching with MIT, such as "conflict occurring in applications" and "finding it difficult to manage the classroom", were encountered. Regarding participants' thoughts concerning the evaluation and measures of the theory, the sub-themes "measures giving more reliable results" and "outcome and processes providing unity" were reached. However, the negative sub-themes for the theme were stated as "not having a standard evaluation method" and "teachers having difficulty in examining outcome files". A quotation from the T97$_{p.76}$ coded study stated that, "*For me, classes being overcrowded makes it difficult to identify students' intelligences and examine outcome file*s", which was thought to be a reference that could be an example of the sub-themes.

Whilst the sub-themes for the positive responses concerning the relationship between duty and responsibility awareness and learning for teaching with MIT were formulated as "increasing responsibility awareness to learn other lessons" and "increasing students' undertaking of responsibilities and being more motivated"; the negative responses were presented as "teachers being passive" and "teachers not being able to allocate time for every student". The sub-themes for the thinking skills theme were categorized as "developing self-criticism and self-expression skills" and "increasing multi-dimensional thinking, creativity and productivity". Responses that refer to these sub-themes can be found in the M15$_{p.74}$ coded study, which states that "*When I read the information related to MIT, I decided that my intelligence was stronger. It is so good to be able to use what I learn [...] I can be creative with long lasting knowledge*". The sub-themes for the negative responses concerning the theme were categorized as "finding it difficult to develop stereotyped knowledge" and "preventing the chance to solve sufficient problems". A sentence from the M15$_{p.74}$ coded study, "*As it took a long time in lessons teaching with MIT, we could not solve many questions. In my opinion, it is not appropriate for this lesson*", is a reference characteristic to the related sub-theme.

The responses concerning difficulties encountered in teaching with MIT. One of the main themes of the research is the difficulty encountered in teaching with

MIT. The responses concerning the theme were separated into six different sub-themes. They were presented having been supported through direct quotations from the studies used in document analysis. In this context, as far as the "overcrowded classes" theme is concerned, the quotation from the T97$_{p.70}$ coded study notes that "*It is very difficult to teach with MIT in these overcrowded classes in our school. Firstly, class sizes in our schools should be reduced to enable teachers to achieve their lessons' objectives, increase achievement and participation*". This quotation appears to support the theme. In addition, the responses in the T97$_{p.76}$ coded study note, "*Another matter is that the activities take a long time and the reasons for this is the school's physical infrastructure and difficulty in finding some equipment*". This quotation is a reference for the sub-themes "having difficulty in reaching all students", "wasting time" and "lack of equipment".
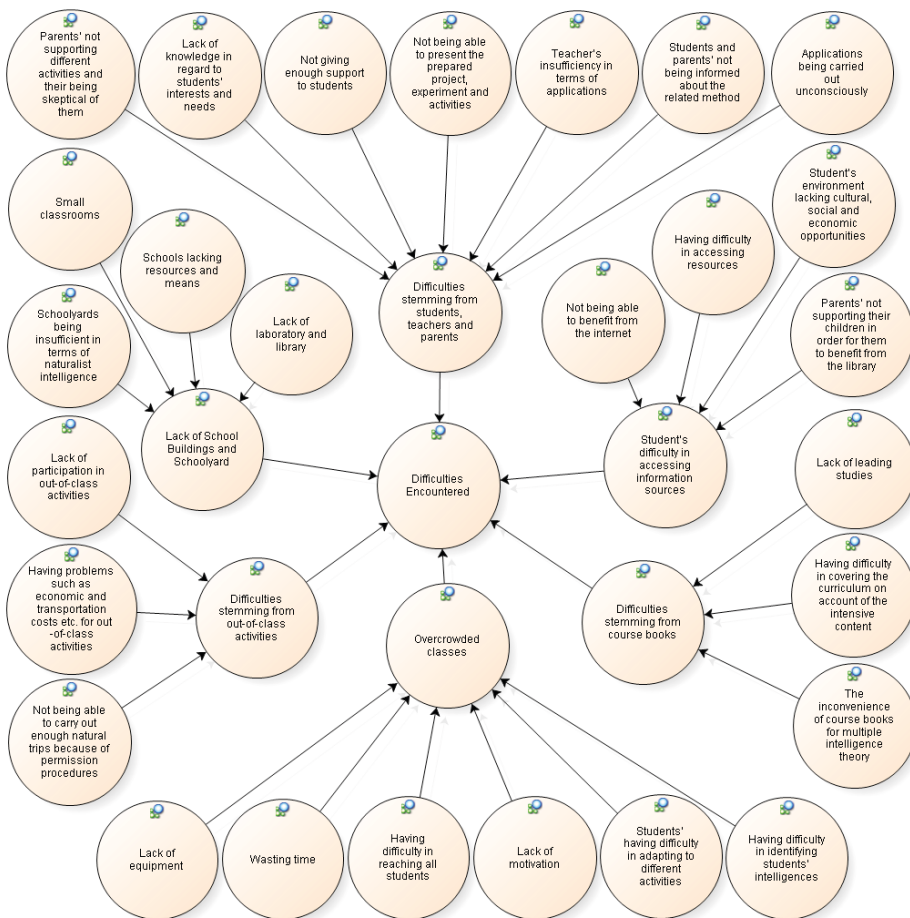

Figure 3. The difficulties concerning teaching with MIT.

Another theme that was formed by the participants' responses is "difficulties stemming from students, teachers and parents". The sub-theme, "teacher's insufficiency in terms of applications", was generated under this theme and a quotation from the T97$_{p.70}$ coded study, "*the most important reason for other teachers' and my insufficiency is that we lack sufficient information*", was given to support the sub-theme. The sub-theme "parents do not support different activities and their being skeptical of them" was expressed as difficulties stemming from parents. A response from the T97$_{p.68}$ coded study noted that, "*The fact that parents lack information about the new program and they are skeptical about the activities at the school pose a challenge for us*". This quotation was shown as a reference for the sub-theme. Similarly, the sub-theme "students and parents not being informed about the related method" points out the difficulties stemming from students and parents. A quotation from the T97$_{p.69}$ coded study, "*Students and parents have to be informed about MIT at the beginning of the academic year. Time problems in MIT can be overcome by increasing a school's resources and opportunities*", was given as reference for the difficulties.

"Difficulties stemming from course books*"* was another theme that was studied during the qualitative research. The sub-theme "having difficulty in covering the curriculum on account of the intensive content" was formed for this theme. A quotation from the T99$_{p.53}$ coded study noted that, "*It is not possible to cover the curriculum whatever I do in the course book*" and was indicated as a reference for the sub-theme. On the other hand, the sub-theme, "the inconvenience of course books for multiple intelligence theory", was formed based on a quotation from the T99$_{p.54}$ coded study, which suggested that, "*Books have to be prepared according to MIT. Particularly, they have to appeal to the eyes and attract students' attention*". Another difficulty for the theory was expressed as "students' difficulty in accessing information sources". The sub-themes "students' environment lacks cultural, social and economic opportunities" and "having difficulty in accessing resources" were formed for this theme. A quotation from the T97$_{p.78}$ coded study noted that "*The difficulty I face in teaching with MIT is that the students' environment lacks cultural, social and economic opportunities*" was a basis for forming the sub-themes. The sub-themes that concern the state of physical conditions, such as "small classrooms" and "schools lacking resources and means" were found in the context of the theme "lack of school buildings and schoolyard". A theme concerning the last negative aspect of teaching with MIT was formed under the heading of "difficulties stemming from out-of-class activities". This theme was separated into sub-themes, such as "not being able to carry out enough natural trips because of permission procedure" and "having problems such as economic and transportation costs etc., for out-of-class activities". In this way, the problematic aspect of the theory was dealt with.

Participants' thoughts concerning the distribution of MIT areas. The last theme of the research was to present the participants' thoughts concerning the distribution of MIT areas via categorization. In this context, the sub-theme "acquiring the ability to interpret from different angles" was formed under the heading "Verbal-Linguistic Intelligence". A quotation from the M7$_{p.1349}$ coded study noted that, "*After reading texts in lessons, we were conducting activities and dramatizing the texts. We were interpreting the texts in different perspectives by dividing them. This was developing our thinking capacity and giving us the opportunity to develop our speaking ability*". This quotation was indicated as a reference for the sub-theme. In addition to the positive responses concerning verbal-linguistic intelligence, such as "providing chances to criticize and discuss a work" and "acquiring the ability to ask questions appropriately concerning context", negative sub-themes such as "verbal-linguistic intelligences being boring at times" and "students not having adequate expressive force" were also found. The responses found in the T97$_{p.78}$ coded study, such as "*Students not having adequate expressive force, their lack of self-confidence and the most important problem for them: not to be able to express their feelings and thoughts, and their being shy*" were taken into account to form the sub-themes. For the second intelligence area, "Logical-Mathematical Intelligence", the following sub-themes were composed. The sub-themes "providing opportunities to compare
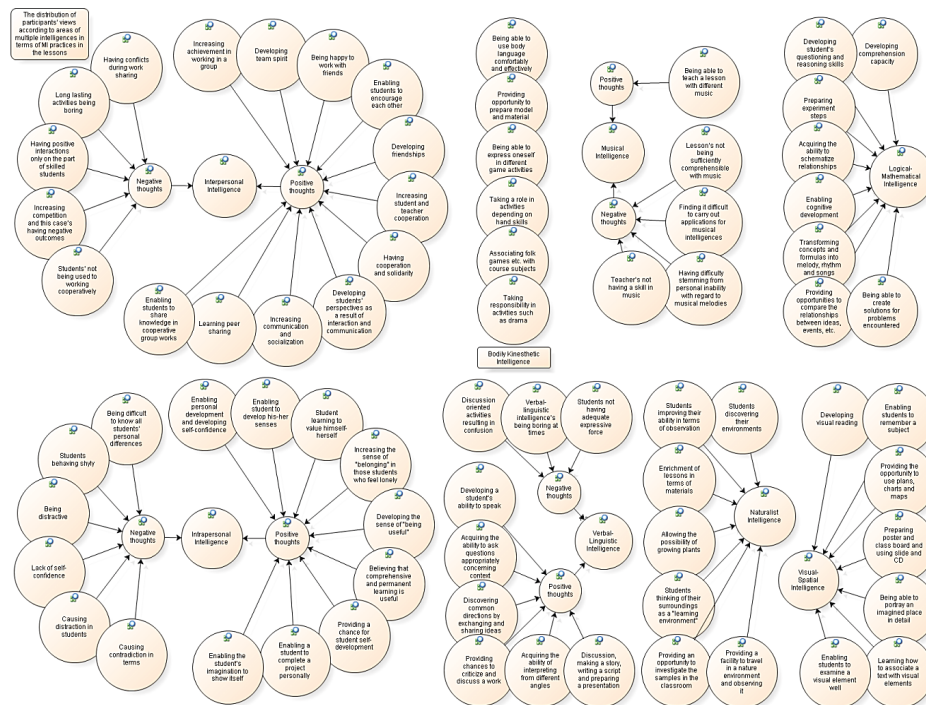

Figure 4. The participants' thoughts concerning the distribution of MIT areas.

the relationships between ideas, events or circumstances" and "acquiring the ability to schematize relationships" were quoted from the T95$_{p.77}$ coded study. The sub-theme "developing comprehension capacity", which emphasizes that it is possible to develop cognitive thinking skills with the related intelligence area, was created; it was supported with a quotation from the T65$_{p.107}$ coded study, which noted, "*In my opinion, the most important thing is to enable students to participate in the lesson. If he/she participates in the lesson, he/she understands that lesson much better*".

The sub-themes such as "being able to portray an imagined place in detail", "preparing poster and class board and using slide and CD" and "developing visual reading" were formed for the theme "Visual-Spatial Intelligence". In addition, the sub-theme "enabling students to remember a subject" was constituted based on a quotation from the T11$_{s.98}$ coded study, which noted, "*I can remember information easily through the visuals in different applications*". Another theme of the research is "Bodily Kinesthetic Intelligence". For this theme, the sub-themes, such as "being able to use body language comfortably and effectively", "associating folk games etc., with course subjects" and "providing an opportunity to prepare a model and material" were created. The sub-theme "providing a chance for student self-development", which was taken from a quotation from the T102$_{p.81}$ coded study, *"it reveals in which area a student has skill, thereby enabling his/her personal development and more productive*", is located within the theme "Intrapersonal Intelligence". In addition to these positive responses, a negative sub-theme "being difficult to know all students' personal differences" was found and a sentence from the T99$_{p.55}$ coded study, "*I teach 13 different classes with 2 hours for each class per week. I have 370 students and it is not possible for me to know their personal differences*", was shown as a reference for the sub-theme.

The sub-theme "being able to teach a lesson with different music" was created considering the T95$_{p.77}$ coded study in the context of the theme "Musical-Rhythmic Intelligence". On the other hand, the negative sub-themes, such as "finding it difficult to carry out applications for musical-rhythmic intelligences" and "teacher not having a skill in music" were formed, taking into account the participants' negative responses recorded in the T97$_{p.79}$ coded study. The quotation from the same study, "*The fact that a teacher does have a skill in music and he /she has a lack of musical instruments creates difficulty.*", was indicated as a reference for the sub-themes. Another theme of "Interpersonal Intelligence" is important to examine. Under this theme, the sub-themes such as "enabling students to share knowledge in cooperative group work" and "having cooperation and solidarity" were generated. A quotation from the T65$_{p.107}$ coded study, "*We are in cooperation and solidarity. It is pleasant and enjoyable to study with a group*", was presented to support the sub-themes. In addition to the positive sub-themes, such as "increasing student and teacher cooperation" and "increasing achievement in working in a group", there are negative sub-themes, such as "having conflicts during work sharing" and "increasing

competition and this case's having negative outcomes", which were taken from the T103$_{p.91}$ coded study. The last theme of the research is "Naturalist Intelligence", which was constructed based on the participants' responses. The sub-themes such as "providing an opportunity to investigate the samples in the classroom" and "providing a facility to travel in a nature environment and observe it", taken from the T95$_{p.77}$ coded study, and another sub-theme, "students thinking of their surroundings as a 'learning environment'", taken from the T103$_{p.93}$ coded study, were presented for the theme.

The Experimental Results Related to Post-Complementary Data

As the research used McA, the second stage of the research is presented here with the aim of supporting pre-complementary information obtained through meta-analytical and document-based thematic data. In this section, firstly, the results of the experimental research carried out for the determined deficiencies of the first stage are shared. In this context, the achievement test was applied to the experimental and control groups after the application of MIT in the 12th grade English course. The SPSS analysis results are presented in Table 5. The difference between the posttest scores of the control group, in which the traditional approach was used, and of the experimental group, in which MIT was used, was determined by t-test, while the homogeneous distribution of variances was by the Levene test.

Table 5
Comparing the post-test scores of cognitive academic achievement test

Groups	n	$\overline{X}$	ss	sd	Levene		t	p	ES
					F	p			
Experimental	32	19.78	2.06						
Control	32	18.47	2.23	62	.601	.441	2.447	.017	0.603
Total	64								

*$p < .05$, ES: Effect Size.

When Table 5 is examined, a statistical significance was identified between the posttest scores of the experimental and control groups ($t = 2.447$, $p < .05$). It appears that this significance is in favor of the experimental group ($\overline{X}_{deney} = 19.78$; $\overline{X}_{control} = 18.47$). This result means that MIT had positive effects on academic achievement and that the experimental result is consistent with meta-analytic and thematic results in the first stage. In addition, the effect size of the experimental study was calculated to be ES = 0.603, which is at the medium level according to Cohen (1992). It is clear that the using MIT has both meaningful and positive effect on academic achievement.

Thematic Results Based on the Participants' Views Related to Post-Complementary Data

In the context of McA, a qualitative aspect whose aim was to complement the experimental aspect and which was generated from students' views was added. When

students' views are considered, it is seen that although there are certain problems such as overcrowded classes or physical conditions, etc., in the use of MIT, it is also clear that MIT can improve thinking skills, present different activities and ensure versatile learning through which an increase in students' academic achievement can be seen. It can be observed that these views of students were presented in two models with the themes determined as "General Advantages of MIT" and "Limitations of MIT".
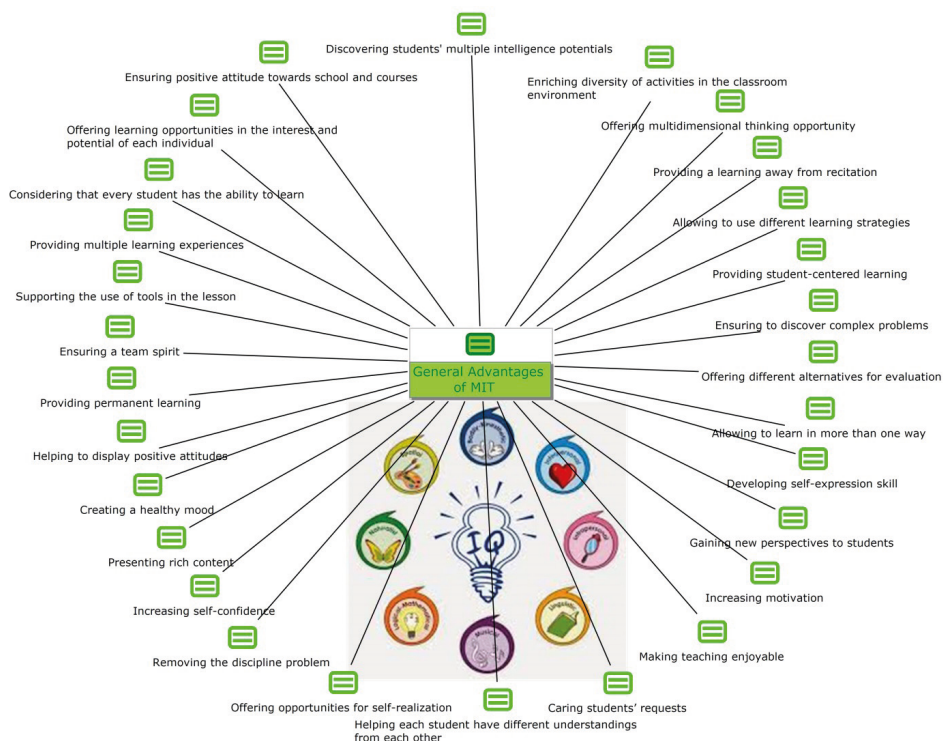

Figure 5. General advantages of MIT.

Looking at Figure 5, certain striking codes drew our attention, namely, "Allowing to learn in more than one way", "helping each student have different understandings from each other", "gaining new perspectives to students", "offering multidimensional thinking opportunity", "allowing the use of different learning strategies" and "discovering students' multiple intelligence potentials", etc. One of the expressions that can be shown as a reference to the related codes was stated by 5G-F: "*While learning with MIT, I saw that a subject can be presented within different ways. Thus, it made me gain the ability to view the events with different perspectives*". 13M-M, on the other hand, pointed out that, "*topics in the lesson can be understood differently by each student. In the lesson based on MIT, different levels of learning were considered and every student had a chance to learn the subject in some way*". Anyway, some of the codes that drew attention in the model are stated as "offering opportunities

for self-realization, increasing self-confidence, helping to display positive attitudes, increasing motivation, to increase learning desire". These codes are based on the views of the participants one of whom is 7G-M, stating, "*I destroyed my prejudices against English thanks to MIT. My self-confidence and learning enthusiasm has increased by this way*"; the other one is 11M-F remarking that "*using a variety of ways in the lesson motivated me and made me love the lesson much more.*"
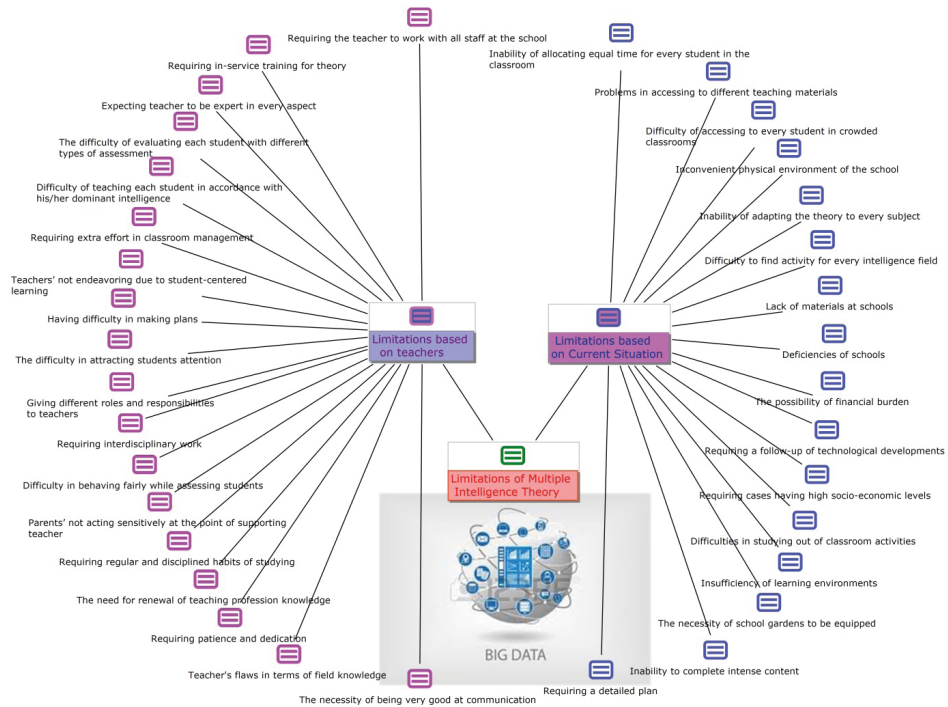

Figure 6. Limitations of MIT.

In addition to the positive views on MIT, the limitations of this theory have also been expressed. The limitations of the theory stated by the students are categorized under two separate themes: "Limitations based on teachers" and "Limitations based on current situation". When Figure 6 is considered, codes related to the limitations based on teachers can be seen as "difficulty of evaluating each student with different types of assessment", " requiring extra effort in classroom management", "difficulty of teaching each student in accordance with his/her dominant intelligence", "requiring interdisciplinary work" and "difficulty in behaving fairly while assessing students". These codes were quoted from certain sentences expressed by 23L-F as follows: "*when the same topic is taught for many times via different methods, some students may get bored and they can start to talk. At this time, it may be difficult for teachers to manage the classroom*". Another quotation from the 8G-M coded student noted that, "*Our teacher who assesses our performance through MIT both had difficulty in*

assessing and also did not behave equally while evaluating different performances. Thus, his scoring was strange to us". In addition, the other response that refers to the related codes above was found in 16M-F coded student's expression: "*It is very tiring and difficult for the teacher to teach in accordance with each student's intelligence. Trying to teach a subject for many times requires patience and energy to describe it in different ways*". At this point, it is understood that teachers need to have a good level of professional and pedagogical skill as well as field knowledge.

The limitations arising from the current situation within the context of MIT are also mentioned. Under this theme, it is seen that some of the codes are related to particularly physical conditions, such as "deficiencies of schools", "problems in accessing to different teaching materials", "inconvenient physical environment of the school" and "insufficiency of learning environment". A quotation from 10M-F coded student, "*we needed many things such as visual, auditory and real materials for MIT. It was very difficult to get all these materials. Sometimes there are even shortcomings*", was indicated as a reference for the related codes. Another quotation from 3G-F coded student, "*The fact that our class was small in terms of size made the works more difficult. This situation prevented the activities in the class to be at the desired level*", also supported the related codes above. On the other hand, there are certain striking codes such as "difficulty to find activity for every intelligence", "inability of adapting the theory to every subject", "inability to complete intense content" and "requiring a detailed plan". These related codes were quoted from certain students' expressions, one of which is "*it was quite enjoyable to study with MIT, but I think some topics are not convenient for being taught through MIT*" (7G-M), and "*we skipped some topics in our book in order to come up with the next subjects in our English book, because it took a long time to complete the subjects via using MIT in the book*" (14M-M).

Conclusion and Discussion

This research has tried to determine the effect of MIT on academic achievement through McA. In this context, the effectiveness of MIT on academic achievement was examined by meta-analytical and thematic analysis in the first stage, and by experimental and thematic analysis based on students' views in the second stage. It aimed to reach the experimental and the thematic findings in the second stage on the basis of the deficiencies related to MIT determined in the first stage. In the third stage (pre-complemetary data), the findings of the first and second stages were *synthesized* in the context of the related proposals, aiming to reach comprehensive, reliable and valid results. The results were interpreted separately by comparing them with other studies carried out in the related field and then presented in relation to each other. In addition, in the third stage, some suggestions have been put forward at this point by giving the common result obtained from the findings.

In the first stage, when the data concerning the students' academic achievement points in the meta-analytic studies based on the determined criteria were evaluated according to the REM, the effect size value was found to be .950. This value was interpreted as situated in a large scale and as positive and significant according to Cohen's (1992) classification; this result indicates that the effect size level of MIT on academic achievement is high. At this point, the results of the study also show consistency with those that were not included in the analysis. The excluded studies can be listed as follows: the MA theses on a national level (Çakan, 2006; Moradaoğlu, 2006; Taşezen, 2005; Türkuzan, 2004); PhD dissertation (Bümen, 2001); articles (Azar, Presley, & Balkaya, 2006); conference/congress (Kıray & Göktaylar, 2004), and a variety of studies on an international level (Kuo, Maker, Su, & Hu, 2010; Sulaiman, Abdurahman, & Rahim, 2010; Zhao, Zhang, & Vance, 2013). For this reason, the results for the meta-analytic study concerning students' academic achievement can be said to be quite consistent with the related literature. On the other hand, it can be seen in Tabuk's (2009) Ph.D. dissertation that MIT does not have a statistically significant effect on students' lesson achievements and their attitude to their lessons.

The studies in the meta-analysis were examined at four different education levels to investigate the effect sizes of the education levels. In the related education level, the highest effect size was in the primary school (ES: 1.139) and the lowest effect size was in the high school (ES: 0.708) groups. It was also seen that all the education levels except the high school group (effect size level: medium) had a large effect size. However, the effect sizes on all education levels apart from the university group (N: 3) were positive. As the data concerning this group were obtained from just three comparisons, it can be said that it cannot be right to generalize the effect size for this group; rather, the data only give information about the current situation. Rosenberg, Adams, and Gurevitch (2000) have emphasized that Hedges' g value, which is used to calculate effect size, can give valid results in at least five comparisons. For that reason, it should be stressed that more experimental studies at the national and international level are required in order to generalize the results of the analysis to the related group.

The lessons were separated into five different groups (Science, Mathematics, Social Sciences, Foreign Language and Others) to investigate the total effect sizes of the studies examining teaching with MIT in relation to subject area. Whilst Foreign Language had the lowest effect size (0.458), Social Sciences had the highest effect size (1.178). The total effect size was 0.935.

Another meta-analytical finding of the research was determined to find the effect sizes by examining the studies in terms of the teaching period. When considering the related findings, the lowest effect size in the 2-4 week period (0.857) and the highest effect size in the 7-8 week period (1.232) in five different teaching periods

were seen. It was understood that all the groups had a large effect size according to Cohen's (1992) classification. On the other hand, it was seen that there were not any significant differences ($Z = 15.770$, $p = .288$) amongst the groups when the effect sizes for the inter groups in relation to the teaching period were taken into consideration. This result can be interpreted as teaching with MIT having a large effect size on all teaching periods. In addition to the meta-analytical findings, the thematic results based on the document analysis are also presented so as to support the meta-analytical findings and to ensure data richness. In this context, the effect of teaching with MIT on students' academic achievements was determined through document analysis by constructing the themes and sub-themes. The findings based on the participants' responses concerning the effectiveness of MIT, the problems encountered in teaching with MIT and the distribution of MIT areas were accepted as the main themes and the results for the themes and sub-themes regarding the main themes are presented separately.

The sub-themes under positive responses included "MIT provides each student with convenient teachings in the teaching process" and "creating effective and efficient learning outcomes by providing natural and attractive learning environments" under the theme of the positive and negative responses to the effectiveness of MIT, which is one of the most important main themes of the research. At this point, using the theory appropriately and effectively increases students' academic achievements, which are similar to the results of this study, and this is mentioned in the study carried out by Emendu and Udogu (2013). The sub-themes regarding lesson planning themes revealed that the theory encouraged teachers to be well prepared for their lessons by reviewing the subjects they would teach in their lesson in order to conduct more qualified and planned lessons. Yılmaz (2008), in his similar study on this issue, arrived at the conclusion that if teachers take students' intelligence characteristics into account in the process of planning lessons and teaching, such processes will positively affect students' achievements, which is consistent with the results of the current study. However, in this regard, the sub-theme of "being difficult to make a lesson plan for every intelligence area" was emphasized in that the teacher participants had difficulty in preparing a lesson plan for every intelligence area and they stressed that the poor preparation of current course books was a big problem. This issue was also stressed in the study by Azar, Presley, and Balkaya (2006), in that pre-service teachers at education faculties have to be made to prepare lesson plans based on MIT considering the teaching theories, which supports the results of the current research. When the theme "evaluation and measure" for teaching with MIT was examined, the sub-themes which were constructed based on the participants' responses revealed that the theory centers on students in the evaluation aspect; the reliability of the evaluation results considering every student as an individual is high and that a more realistic and correct approach is displayed. It was seen that MIT motivates students to

take on duties where the themes "duty and responsibility awareness" are concerned. The duties corresponding to students' interests, levels and skills enable them to fulfill their duties completely through self-motivation. In addition, the sub-themes concerning the findings in thinking skills emphasize that MIT helps students to generate different ideas, evaluate events in a sophisticated manner and develop their skills to find creative solutions for problems. According to Güney's thesis (2007), the fact that students choose the activities arranged according to each intelligence area and eagerly participate in the activities generates more creative outcomes. This result is used as a reference for the results of the current study.

In addition, the positive effects of MIT and the responses to the difficulties encountered in teaching with the theory were presented as a main theme in the study. The theme for the basic problems stemming from overcrowded classes, student-teacher-parent relationships, course books and students' access to information sources, school buildings and outdoor facilities and non-class activities was meticulously constructed as arranged above and direct quotations were presented to support the themes. It was understood that the most important difficulty in teaching with MIT stems from overcrowded classes. In this case, reducing class size is thought to increase the effectiveness of the theory and thus teaching quality. On the other hand, teachers' lack of information about the theory and it's not being used effectively can be interpreted as causing negative outcomes. It can be asserted that parents' lack of information about the theory and a lack of support for their children can be overcome through informational courses held by schools and the Directorates of National Education. It is believed that parents will consciously take care of their children and make suggestions when it is necessary and will have a qualified and productive dialogue with them. Another difficulty mentioned in the sub-themes of the research is that several course books do not take into account teaching with MIT. It was understood that the difficulties faced in implementing the theory effectively can be seen in various negative characteristics of course books, including a lack of sufficiently diverse activities, too many subjects and the need to realize educational attainments along a definite timescale, etc. In this regard, Azar, Presley, and Balkaya (2006) mention that time problems in teaching with MIT could be overcome by examining and evaluating subject content carefully. In this way, it can be stressed that teachers can make lesson plans that aim at "teaching" rather than covering subjects in a certain period by providing different students with a variety of activities without feeling anxious about covering subjects within a certain timeframe. With regards to the shortcomings of various course books, Batdı (2010) arrived at a conclusion in his MA thesis dealing with English course books that the course books are insufficient in supporting learning when using contemporary teaching techniques. His work is a reference for the related results of this study. On the other hand, the difficulties students face in accessing information sources were mentioned in several sub-

themes. The reason for this can be attributed to the fact that the students' eagerness to benefit from any source is restricted because of socio-cultural and economic reasons. In this regard, several improvements and innovations on this issue (e.g., child rearing, parent-child and individual-society relations, social identity and student-parent-school cooperation) can be conducted to improve parents' socio-cultural levels through state support. It should be noted that free-of-charge books distributed to students and scholarships provided by the state can solve many of the problems surrounding this issue. Another problem in teaching with MIT is that schools often lack sufficient and appropriate physical conditions. The problems such as small classrooms, schools' lack of sufficient sources and facilities and school gardens not being equipped with the tools to carry out a variety of activities were mentioned in the sub-themes as obstacles to teaching with MIT. Similarly, Kucur's (2007) results overlap with those of this study by mentioning issues such as school buildings and gardens being inconvenient for teaching with MIT. At this point, reducing class sizes, building additional classrooms and making necessary changes to school gardens can be suggested in order to improve the effectiveness of MIT.

The final theme concerning the distribution of intelligence areas was examined in the scope of the research and the sub-themes constructed for the eight themes based on a theoretical basis (verbal-linguistic, logical-mathematical, visual-spatial, bodily-kinesthetic, intrapersonal, musical-rhythmic, interpersonal and naturalist intelligences) were interpreted separately. Students with verbal-linguistic intelligence are those who have a good level of verbal expression, can be more active in lessons, can exchange ideas and can develop self-confidence. Students using numerical fields in regards to the logical-mathematical intelligence area can be thought to increase their questioning and logical thinking skills. Those who use the visual-spatial intelligence area can be said to learn permanently, depict information in detail and acquire visual reading skills. Pishghadam, Khodadady, and Khoshsabk (2010) revealed that teaching that supports visual intelligence using pictures, drawings, graphics and images has a positive effect on students' ability to remember and their permanent learning, which supports the result of this study. Both entertainment and learning are conducted using the bodily-kinesthetic intelligence area. In this respect, Demirci's study (2005) shows that the majority of students preferred activities with MIT because they were entertaining. This overlaps with the results of this study. In addition, students develop their self-confidence by improving their competence in using their body language comfortably and effectively. It is understood from the sub-themes regarding the intrapersonal intelligence area that MIT contributes to a student's personal development.

The sub-theme "being able to teach a lesson with different music" concerning the musical-rhythmic intelligence area was presented in the research. This sub-

theme was supported by the results that show songs support memory in learning and that repetitions make learning permanent. This is shown in Batdı's (2013) PhD dissertation dealing with English teaching and entertaining educational activities. When the sub-themes concerning interpersonal intelligence were examined, it was understood that feelings of cooperation and solidarity develop, and communication between friend-teacher-student increases. Moreover, each individual can engage in healthy communication and group work brings about higher levels of achievement. In the last theme of the research concerning naturalist intelligence, it was understood from the sub-themes that students see their environment as a learning medium through discovery and their ability to visit, observe, search and discover. These results can be interpreted as the fact that naturalist intelligence enables students to gain skills to associate what they learn with their environment and to make learning possible in a more natural and realistic environment. If the main aim of the education system is to reach educational goals and to increase the efficiency in doing so, it is necessary to educate students who will be able to be successful in all MIT areas.

In the context of the McA based research, conclusions inferred from the experimental results that were achieved in the second stage are presented here. Meta-analytical results from pre-complementary information indicate that no study that includes the use of MIT at the 12th grade of high school has been achieved. Also, according to subject area, the least number of studies were found in foreign language courses. For this reason, it is decided that the experimental dimension of the research would be conducted with 12th grade High School English. When the experimental findings at this point were examined, a significant difference was found in favor of the experimental group ($\overline{X}_{experimental}$ = 19.78; $\overline{X}_{control}$ = 18.47), between the experimental group in which MIT was used, and the control group in which the traditional approach was used (t = 2.447, p <.05). This has shown that MIT has a positive effect on academic achievement. In addition, it has been understood that the results achieved are consistent with the pre-complementary data (meta-analytical and thematic) and that they support each other.

In the second stage, the thematic findings based on the views of students applied after the experimental application were sought in order to contribute to experimental data and to provide data diversity. At this point, different themes and codes have been reached from the views that were received from the students selected from the experimental study group according to maximum sampling. The findings related to "the general advantages of MIT" and "limitations based on teachers/current situation" were examined. The results concluded that MIT has the potential to enable each student's learning; it attracts students with different activities, provides permanent learning, and reveals different learning potentials. In this sense, it can be asserted that MIT facilitates learning and makes students like learning. However, limitations

arising from teachers or the current situation are also mentioned. It is understood that problems such as teachers' lack of knowledge about the application of MIT, inadequacies in the teaching profession, difficulties in making alternative evaluations and problems in class management negatively affect the efficiency of the theory. At this point, it can be suggested that teachers should participate in regular in-service training, develop their research habits about contemporary theories and approaches, and engage in actions that will contribute to their professional development. In addition, it may be advisable for them to attempt actions such as developing technological skills, becoming a member of different educational sites, and following current developments in education. On the other hand, it has been seen that in the context of the limitations of MIT based on the current situation, shortcomings in the physical conditions are particularly mentioned. The crowded classes, the size of the classrooms, the physical environment of the school, the financial burden and the socio-economic level have all been highlighted. State support may be provided to alleviate the financial problems. It can also be suggested that classes be created in a more ideal number and that the class size be large enough.

As a result, it is understood from the meta-analytical and thematic results in the first stage of the research that MIT has positive effects on academic achievement in comparison with traditional methods in terms of teaching grade, subject area, teaching period, intelligence area and general characteristics. In addition, in the pre-complementary findings, it was observed that very few studies were conducted at high school level and in the field of English related to MIT; thus, the dimension of experimental design was added to the research accordingly. The experimental and thematic results of the second stage of the research also showed that the effect of MIT on academic achievement was positive and significant. When both research results (pre- and post-complementary results) are synthesized, it can be stated that MIT has a positive effect on academic achievement despite some limitations that can be removed if necessary measures are taken. Thus, it can be said that this result, which was obtained on the basis of four different data sources, has a high validity and large scope. It is recommended that future studies be carried out in this direction, given that the McA, which ensures the achievement of reliable research results, will be of interest to researchers.

References

The references marked with an asterisk (*) are the ones included in the analysis

*Abdi, A., Laei, S., & Ahmadyan, H. (2013). The effect of teaching strategy based on multiple intelligences on students' academic achievement in science course. *Universal Journal of Educational Research, 1*(4), 281–284. http://dx.doi.org/10.13189/ujer.2013.010401

Akbari, R., & Hosseini, K. (2008). Multiple intelligences and language learning strategies: Investigating possible relations. *System, 36,* 141–155. http://dx.doi.org/10.1016/j.system.2007.09.008

*Akkuş, L. (2007). *The effect of teaching 11ᵗʰ grade chemistry course alcohols and ethers unit based on the multiple intelligences theory on students' achievement, attitude and knowledge retention* (Master's thesis, Balıkesir University, Balıkesir, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Akkuzu, N., & Akçay, H. (2011). The design of a learning environment based on the theory of multiple intelligence and the study its effectiveness on the achievements, attitudes and retention of students. *Procedia Computer Science, 3*, 1003–1008. http://dx.doi.org/10.1016/j.procs.2010.12.165

*Alıntaş, G., Kahraman, E., & Altıntaş, S., U. (2013). The effects of the integration of technology into science teaching process on the students' multiple intelligence fields, attitudes, academic success and recalling level. *Journal of Research in Education and Teaching, 2*(4), 84–91.

*Altuntaş, N. (2007). *The effect of learning process according to multiple intelligences theory on 7th grade students' success in mathematics* (Master's thesis, Marmara University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Al-Wadi, N. I. (2011). *Teachers' perceptions toward enhancing learning through multiple intelligences theory in elementary school: A mixed methods study* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3491221)

*Aydoğan, B. (2006). *The effects of "mathematics" course taught by multiple intelligence based instruction on learning, permanent learning, students' and teachers' thoughts in teaching process for 7ᵗʰ grade* (Master's thesis, Eskişehir Osmangazi University, Eskişehir, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Azar, A., Presley, A. İ., & Balkaya, Ö. (2006). Effect of multiple intelligence theory based instruction on students' achievement, attitude, retention, and process skills. *Hacetepe University Journal of Education, 30,* 45–54.

*Babacan, Ş. (2006). *The effects of multiple intelligences theory supported with cooperative learning on achievement in teaching the unit our Turkey of the geography lesson which is one of the 6th grade social sciences lessons* (Master's thesis, Çanakkale Onsekiz Mart University, Çanakkale, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Babelan, A. Z., & Moenikia, M. (2010). Role of emotional intelligence in predicting students' academic achievement in distance education system. *Procedia Social and Behavioral Sciences,* 1158–1163. http://dx.doi.org/10.1016/j.sbspro.2010.03.165

*Bak, Z. (2004). *The effect of multiple intelligences theory based guide materials on chemistry achievement* (Master's thesis, Karadeniz Teknik University, Trabzon, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Başbay, A. (2000). *An analysis of curriculum and classroom activities according to multiple intelligence theory* (Master's thesis, Hacettepe University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Başli, L. (2006). *Application of multiple intelligence theory in teaching Geography and its effect on students' academic achievement* (Master's thesis, Marmara University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Batdı, V. (2010). *An assesment of teacher's opinions about the effectiveness of English coursebook used in foreign language high schools (Case of Elazığ and Diyarbakır Cities)* (Master's thesis, Fırat University, Elazığ, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Batdı, V. (2013). *The effect of using enjoyable cooperative learning supported educational activities on students' self-efficacy skills, self-regulation strategies, metacognitive strategies, motivation and academic achievement in English language teaching* (Doctoral dissertation, Fırat University, Elazığ, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Batdı, V. (2016, May). *Metodolojik çoğulculukta yeni bir yönelim: trend programlarla çoklu bütüncül bir yaklaşım*. Paper presented at the 7th International Congress on New Trends in Education, Konyaaltı-Antalya, Turkey.

*Beyazıt, E. (2009). *The effect of multiple intelligence based education method to the level of student success in the primary schools center off Mardin* (Master's thesis, Atatürk University, Erzurum, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Bozdeveci, Z. (2005). *The effects of application of multiple intelligences theory upon the learning and recalling process in the unit of "innovations in Europe" in the 7th grades of social science teaching* (Master's thesis, Erciyes University, Kayseri, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Boztepe, İ. (2010). *The impact of multiple intelligence theory on the student success level with respect to the probability subject on mathematic at 6th grade* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Bulut Pedük, Ş. (2007). *A study on the effect of mathematics education given based on multiple intelligence theory to six years old children's mathematics ability* (Doctoral dissertation, Ankara University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Bümen, N. (2001). *The effects of implementation of the multiple intelligences theory supported by reviewing strategies on students achievement attitude and retention* (Doctoral dissertation, Hacettepe University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Can, Ş., Gök Altun, D., & Harmandar, M. (2010). The effects of multiple intelligence theory on achievement, attitude and retention. *e-Journal of New World Sciences Academy, 6*(1), 147–168

Castejon, J. L., Perez, A. N., & Gilar, R. (2010). Confirmatory factor analysis of Project Spectrum activities. A second-order g factor or multiple intelligences? *Intelligence, 38,* 481–496. http://dx.doi.org/10.1016/j.intell.2010.07.002

Chan, D. W. (2007). Musical aptitude and multiple intelligences among Chinese gifted students in Hong Kong: do self-perceptions predict abilities? *Personality and Individual Differences, 43,* 1604–1615. http://dx.doi.org/10.1016/j.paid.2007.04.029

Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science, 1*(3), 98–101.

Cooper, H. (1998). *Synthesizing research: A guide for literature reviews.* Ney York, NY: Sage.

Crombie, I. K., & Davies, H. T. (2009). *What is meta-analysis. What is series?* (2nd ed.). Retrieved August 21, 2014 from http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/meta-an.pdf

Çakan, S. H. (2006). *Applications of multiple intelligences theory in chemistry education* (Master's thesis, Hacettepe University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Çelen, A. (2006). *The Effects of the multiple intelligences theory activities on the achievements of student's cognitive, affective and psychomotor domains at the physical education lesson* (Master's thesis, Abant İzzet Baysal University, Bolu, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Çırakoğlu, M., & Saracoğlu, A. S. (2009). The effects of cooperative learning method supported by multiple intelligence theory on elementary school 4th grade students' academic achievement. *Türk Eğitim Bilimleri Dergisi, 7*(2), 425–449.

DeCoster, J. (2004). *Meta-analysis notes*. Retrieved April, 20, 2013 from http://www.stat-help.com/notes.html

Deeks, J. J., Higgins, J. P. T., & Altman, D. G. (2008). Analysing data and undertaking meta-analyses. In J. P. T. Higgins & S. Green (Eds.), *Cochrane handbook for systematic reviews of interventions*. Version 5.0.1 [updated September 2008]. The Cochrane Collaboration. Retrieved April 12, 2015 from http://www.cochrane-handbook.org

Demirci, E. E. (2005). *Getting students ideas about learning activities applied according to the multiple intelligence fields in fifth class computer lesson in primary school* (Master's thesis, Anadolu University, Eskişehir, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Dilek, F. N. (2006). *The effect of multiple ıntelligence model to the understanding of photosynthesis and respiration subjects and attitude to science of eighth class* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Dincer Çengeloğlu, G. (2005). *The effect of living science lesson teaching activities designed in accordance with multiple intelligence theory on students' success and attitudes* (Master's thesis, Abant İzzet Baysal University, Bolu, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Durmuş Hepyaşar, L. (2006). *The contribution of multiple intelligence to the success of the students in the course of Physics and the students' opinions* (Master's thesis, Uludağ University, Bursa, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Emendu, N. B., & Udogu, M. (2013). Effect of multiple ıntelligence teaching strategies on students achievement and retention ın Chemistry. *The International Journal of Engineering and Science*, *2*(7), 30–34.

*Epçaçan, C. (2013). The effect of teaching applications based on multiple intelligence theory on students' reading comprehension skills. *Turkish Studies - International Periodical for the Languages, Literature and History of Turkish or Turkic, 8*(1), 1335–1353.

*Ercan, Ö. (2008). *The effect of education activities based on multiple intelligence theory on the academic achievements of 8th grade students' mathematics lesson "permutation and probability" unit* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Eren, C., D., & Gürdal, A. (2010). The effect of teaching physics with fragmented teaching method on students' academic success, recalling and attitudes towards groupwork. *Pamukkale University Journal of Education Faculty, 28,* 67–79.

*Erkaçan, İ., Moğol, S., & Ünsal, Y. (2012). The effect of the multiple intelligences theory on grade 9 students' academic achievement and retention of learning about heat, temperature, expansion and compressibility. *Journal of Turkish Science Education, 9*(2), 65–78.

*Etli, C. (2007). *The effect of education activities that are prepared according to the multiple intelligence theory on 9th class students' success of biology and the knowledge that are learned* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Furnham, A. (2001). Self-estimates of intelligence: Culture and gender difference in self and other estimates of both general (g) and multiple intelligences. *Personality and Individual Differences, 31,* 1381–1405.

Gardner, H., & Moran, S. (2006). The science of multiple intelligences theory: A response to Lynn Waterhouse. *Educational Psychologist, 41*(4), 227–232.

Gardner, H. (1986, November). *The theory of multiple intelligence*. A paper presented at the 37th Annual Conference of the Orton Dyslexia Society, Philadelphia, Pennsylvania.

Gardner, H. (1998). A Multiplicity of Intelligences: In tribute to Professor Luigi Vignolo. *Scientific American*, *9*, 19–23. Retrieved August 10, 2014 from http://llk.media.mit.edu/courses/readings/ gardner-multiple-intelligences.pdf

Gardner, H. (2000). Gardner on education: Destination and navigation. *Arts Education Policy Review, 101*(5), 36–40. http://dx.doi.org/10.1080/10632910009600272

Gardner, H. (2005). *Multiple intelligences and education*. Retrieved from http://www.infed.org/ thinkers/gardner.htm

*Gazioğlu, G. (2006). *Multiple Intelligence basis education's effect on student's success, attitude, and permanence of learned knowledge in Primary School's 7th class students understanding the issue of pressure* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez. yok.gov.tr/UlusalTezMerkezi/

Gomez, A. Y. (2009). *Effective teaching strategies according to fifth grade students: A qualitative study* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3391480)

*Gök Altun, D. (2006). *Effect of sound and light unit prepared using multiple intelligence theory to the student success, level of retaining, attitudes towards science and multiple intelligence theory* (Master's thesis, Muğla University, Muğla, Turkey). Retrieved from https://tez.yok.gov. tr/UlusalTezMerkezi/

*Göl, S. (2010). *Multiple intelligences theory of mastery learning of assisted primary 3 mathematics lessons and in-class access to the persistence effect* (Master's thesis, Fırat University, Elazığ, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Görer, H. M. (2008). *The effects of the multiple intelligences theory applied in "the resources of our country" unit of the sixth graders social sciences course on the academic achievement and the attitude of the students* (Master's thesis, Yeditepe University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Gözüm, A. İ. C. (2011). *The success analysis of enyzme subject on science candidate teachers which has been processed according to multiple intelligence method* (Master's thesis, Kafkas University, Kars, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Güler Karadeniz, N. (2006). *Effects of multiple intelligence theory based instruction to achievement in English lesson and the permanence of the learned knowledge of ninth grade students in Anatolian high school* (Master's thesis, Süleyman Demirel University, Isparta, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Güneş, R. S. (2006). *Multiple intelligence basis education's effect on student's success, permanence and attitude of learned knowledge in primary school's 6th class students understanding the issue of five senses* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok. gov.tr/UlusalTezMerkezi/

Güney, S. (2007). *A qualitative research about the applicability of 'multiple intelligence theory' which incorporates 5th class primary school students and the results* (Master's thesis, Yeditepe University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Gürbüzoğlu, S. (2009). *Effect of teaching protein synthesis unit based on multiple intelligence theory to the student success, level of retaining and student's opinions* (Doctoral dissertation, Yeditepe University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Gürbüzoğlu Yalmancı, S., & Gözüm, A. İ. C. (2013). The effects of multiple intelligence theory based teaching on students' achievement and retention of knowledge (example of the enzymes subject). *International journal on new trends in education and their implications, 4*(3), 27–36

*Hamurlu, M. K. (2007). *The effect of instruction based on multiple intelligences theory on the students' achievements in English and their attitudes towards English at 9th grade at foreign language based high school* (Master's thesis, Gaziantep University, Gaziantep, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Harriman, V. (2010). *The effect of multiple intelligence teaching strategies on achievement in reading and mathematics* (Doctoral dissertation) Available from ProQuest Dissertations and Theses database. (UMI No. 3413038)

*Hasenekoğlu, İ., & Gürbüzoğlu, S. (2009). Effect of teaching protein synthesis unit based on multiple intelligence theory, to the student level of retaining. *Ahi Evran University Journal of Kırşehir Education Faculty, 10*(3), 49–59.

*Hazer, Ö. (2013). *The effects of cooperative learning method supported by multiple intelligence theory on sixth grade students' achievement and performance toward probability and statistics of mathematics course* (Master's thesis, Kocaeli University, Kocaeli, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Ilgar, R., & Babacan, Ş. (2012). The effect of multiple intelligence theory supported by cooperative learning method on achievement in teaching geography curriculum. *Hacettepe University Journal of Education, 42,* 212–224.

*Işık, D. (2007). *The effects of cooperative learning method supported by multiple intelligence theory on elementary school fourth grade students' academic achievement and retention toward mathematics course* (Master's thesis, Çukurova University, Adana, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Işık, D., Tarım, K., & İflazoğlu, A. (2007). The effects of cooperative learning method supported by multiple intelligence theory on elementary school third grade students' academic achievement on mathematics course. *Ahi Evran University Journal of Kırşehir Education Faculty, 8*(1), 63–77.

Johnson, W. (2013). Whither intelligence research? *Journal of Intelligence, 1*, 25–35. http://dx.doi.org/10.3390/jintelligence1010025

*Kanat, S. (2008). *The effect of teaching method depending on the multiple intelligence theory in visual art lessons on the success and the sustainability of the learnt information of the 7th grade students* (Master's thesis, İnönü University, Malatya, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Kara, E. (2006). *The effect of multi-intelligence over successes, understandings and behaviors of students in terms of growth and development in primary education eighth grade science course* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Karadağ, R. (2014). Analysis of the graduate theses in the field of reading interest, attitudes and habits: The sample of YOK and ProQuest databases. *Pamukkale University Journal of Education, 35,* 1–17.

*Karakoç, İ. (2006). *The effect of application of the multiple intelligence theory on academic achievement and attitudes in the instruction of the Geography subject of social studies lessons in second degree elemantaryschool* (Master's thesis, Niğde University, Niğde, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Karatekin, K. (2006). *The effect of teaching the subject of direction and finding methods according to multiple intelligence theory on students success at the 4th class of primary school* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kaya, O. N., Doğan, A., Gökçek, N., Kılıç, Z., & Kılıç, E. (2007, April). *Comparing multiple intelligences approach with traditional teaching on eight grade students' achievement in and attitudes toward science.* A paper presented at the Annual Meeting of the American Educational Research Association, Chicago, Israel.

*Kayıran, T. (2009). *The effects of project based learning method supported by multiple intelligences theory on academic achievement, attitudes towards social studies and retention* (Master's thesis, Çukurova University, Adana, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Kılıç Demirkaya, E. (2006). *At primary school music lessons the effect of the teaching based on multiple intelligence theory to the success of the students at 6th grades and to the permanence of the information they learnt* (Master's thesis, Abant İzzet Baysal University, Bolu, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kıray, G., & Göktaylar, A. (2004, July). *The effect of abundant intelligence theory on the learning process in 4th class science lesson.* A paper presented at XIII. National Education Sciences Conference, İnönü University, Malatya, Turkey.

*Koç, İ. (2008). *Based on the theory of multiple intelligences, the effects of project based learning on attitudes and achievement of students 7th grade in social studies lesson* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Korkmaz, B. (2010). *The effects on the success of 9th grade high school biology class students' by teaching the unit "diversity and classification of living things" based on the multiple intelligence theory* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kucur, F. K. (2007). *Multiple intelligences applications at science and technology lessons and difficulties that teachers encounter* (Master's thesis, Selçuklu University, Konya, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kuo, C. C., Maker, J., Su, F. L., & Hu, C. (2010). Identifying young gifted children and cultivating problem solving abilities and multiple intelligences. *Learning and Individual Differences, 20*, 365–379.

*Kurt, M., Gümüş, İ., & Günay Ermurat, D. (2011). Effect of multiple intelligence theory applied for reproduction systems on student academic success. *Iğdır University Journal of the Institute of Science and Technology, 1*(1), 39–44.

*Kuşdemir Kayıran, B. (2007). *The effects of cooperative learning method supported by multiple intelligences theory on reading comprehension academic achievement and attitudes toward Turkish language course* (Master's thesis, Çukurova University, Adana, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

LeCompte, M. D., & Goetz, J. P. (1982). Problems of reliability and validity in ethnographic research. *Review of Educational Research, 52*(1), 31–60.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. California, CA: Sage.

Maddox, J. (2002). *Teacher training in multiple intelligences strategies and cooperative learning structures to effect a change in the classroom* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3078563)

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage.

Moradaoğlu, Y. (2006). *The effect of guidance materials developed based on the multiple intelligence theory on physics achievement* (Master's thesis, Karadeniz Technical University, Trabzon, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Mussen, K. S. (2007). *Comparison of the effect of multiple intelligence pedagogy and traditional pedagogy on grade 5 students' achievement and attitudes towards science* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3289502)

*Öngören, H. (2007). *The effects of multiple intelligence theory based instruction of seventh grade "force, movement and energy" unit on students' science achievement and attitudes towards science* (Master's thesis, Pamukkale University, Pamukkale, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Öz, C. (2005). *The effects of teaching the topic of fractions in accord to multiple intelligences theory on the sixth grades' achievement in primary education* (Master's thesis, Marmara University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

***Özaçık** Erdem, M. (2003). *The applications of the multiple intelligence theory on the subject of acid and base in primary school 8th grade* (Master's thesis, Dokuz Eylül University, İzmir, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Özbay, D. (2013). *Teacher's views about multiple intelligences theory applications in improvement of German writing ability* (Master's thesis, Dicle University, Diyarbakır, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Özcan, Ş., & Bakioğlu, A. (2010). Meta-analytic effect analysis: the effect of in-service training on the job performance of school administrators. *Hacettepe University Journal of Education, 38*, 201–212.

*Özyılmaz Akamca, G. (2003). *The Effects of instruction based on multiple intelligence theory on students science achievement, attitudes towards science and retention of knowledge in primary school fifth grade heat unit* (Master's thesis, Dokuz Eylül University, İzmir, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Pack, J. (2011). *Multiple intelligences and experiential learning styles: A mixed method study of registered nurses' attitudes toward computers and web-based learning* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3444168)

*Pekderin, S. (2006). *The effectiveness of multiple intelligences activities on vocabulary learning in elementary classes* (Master's thesis, Çanakkale Onsekiz Mart University, Çanakkale, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Pishghadam, R., Khodadady, E., & Khoshsabk, N. (2010). The impact of visual and verbal intelligences-based teaching on the vocabulary retention and written production of Iranian intermediate EFL learners. *The Modern Journal of Applied Linguistics, 2*(5), 379–395.

Rosenberg, M. S., Adams, D. C., & Gurevitch, J. (2000). *MetaWin: statistical software for meta-analysis version 2.0.* Sunderland, MA: Sinauer Associates, Inc.

*Saydam, E. (2005). *The effects of the multiple intelligences based learning environment on 6th graders' mathematics achievement* (Master's thesis, Marmara University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Sezer, D. (2008). *Performing the laboratory activities concerning the "matter and heat" section in the new proramme according to multi intelligence theory* (Master's thesis, Yüzüncü Yıl University, Van, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Stanciu, D., Orban, I., & Bocoş, M. (2011). Applying the multiple intelligences theory into pedagogical practice. Lessons from the Romanian primary education system. *Procedia Social and Behavioral Sciences 11*, 92–96. http://dx.doi.org/10.1016/j.sbspro.2011.01.040

Sternberg, R. J. (2014). Teaching about the nature of intelligence. *Intelligence, 42,* 176–179.

Sulaiman, T., Abdurahman, A. R., & Rahim, S. S. A. (2010). Teaching strategies based on multiple intelligences theory among science and mathematics secondary school teachers. *Procedia Social and Behavioral Sciences, 8,* 512–518. http://dx.doi.org/10.1016/j.sbspro.2010.12.070

*Şalap, N. (2007). *The impact of learning activities based on the multiple intelligence theory on the student success: the cell divisions* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Şengül, S., H. (2007). *Effects of multiple intelligence theory based instructıon on sixth grade primary school students' achievement of circulatory system* (Master's thesis, Balıkesir University, Balıkesir, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Şenocak, E. (2012). *Opinions of teachers that intended for multiple intelligence theory-based visual arts education lesson* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Şirin, Ö. (2010). *Effect of applications of multiple intelligent theory about academic success of students about social sciences lecture* (Master's thesis, Fırat University, Elazığ, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Tabuk, M. (2009). *The effects of multiple intelligence approach in project based learning on mathematics achievement* (Doctoral dissertation, Marmara University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Taşezen, S. S. (2005). *The effects of educational instructions which are planned on the principle of multiple intelligence on achievement, conceptual learning and attitudes* (Master's thesis, Marmara University, İstanbul, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Taylor, R. (2007). *The effects of a multiple intelligence self-assessment intervention on adolescents' career decision self-efficacy* (Doctoral dissertation). Available from ProOuest Dissertations and Theses database. (UMI No. 3255628)

*Tekin, T. İ. (2008). *Effect of theory of multiple intelligence on 8th arude primary school student' success in genetically and hereditary structure the topic of and on their attitude and perception toward science course* (Master's thesis, Kafkas University, Kars, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Temur, Doğan, Ö. (2001). *The effects of teaching activities prepared according to the multiple intelligence theory on mathematics achievements and permanence of information learned by 4th grade students* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Torun, Ö. (2009). *The effect of the cooperative learning method supported by multiple intelligence theory on the seventh grade elementary schools in their mathematics subjects of geometrical shapes on their achievement and permanence* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Trevino, G. (2005). *Multiple intelligences: A comparison between at-risk limited English proficient and high-achieving Hispanic high school students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3204099)

Trujillo, J. L. (2002). *The effects of multiple intelligence teaching strategies on the cognitive academic language proficiency of subtractive bilingual students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3064046)

*Turhan, E. A. (2006). *Researching the effects of MI to student's success and attitude in learning the subject magnet and its properties for the primary education at level 8* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Türkuzan, R. (2004). *The effect of the multiple intelligences theory on grade-9 students' comprehension of the density and retention of their knowledge about this topic* (Master's thesis, Gazi University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Viera, A. J., & Garrett, J. M. (2005). Understanding interobserver agreement: The kappa statistic. *Family Medicine, 37*(5), 360–363.

*Yekrek, Ş. (2006). *The effects in level reach and attitude point at primary grade eight in the lesson of "History of Turkish Republic Revolutions and Kemalism" due to multiple intelligences theorems* (Master's thesis, Abant İzzet Baysal University, Bolu, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

*Yıldırım, K., & Tarım, K. (2008). Using multiple intelligence activities and cooperative groups to improve academic achievement and retention. *Elementary Education Online, 7*(1), 174–187.

*Yıldırım, K. (2006). The effects of cooperative learning method supported by multiple intelligence theory on elementary school 4th grade students' academic achievement. *Ahi Evran University Journal of Kırşehir Education Faculty, 7*(2), 301–315.

Yılmaz, A. (2008). Implementing of multiple intelligence theory in the historical subjects of social studies. *Marmara Geographical Review, 18,* 238–252.

*Yörük, İ. (2007). *The effect of the multiple intelligence theory on the realising level of the aims of the religious culture and ethics course in primary education* (Master's thesis, Ankara University, Ankara, Turkey). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Zhao, Q., Zhang, J., & Vance, K. (2013). Motivated or paralyzed? Individuals' beliefs about intelligence influence performance outcome of expecting rapid feedback. *Learning and Individual Differences, 23,* 168–171.