

Effectiveness of Successful Intelligence Based Education on Critical Thinking Disposition and Academic Engagement Students

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Abstract

The current research has been aimed at identifying the effect of successful intelligence theory-based educational pattern on students' critical thinking disposition and academic engagement. This research is an experimental one based on semi-experimental pretest and posttest design with an unequal control group, and the population of this research includes all secondary school girl students of Turkamanchai town in academic year 2016-2017. Among this population, two classes of ninth grade of an available high school were selected and randomly put into two groups of experimental group and control group (20 people in the experimental group and 17 people in the control group). Intelligence based-educational pattern was applied in the experimental group for 12 sessions, and at the same time, the control group was trained in traditional method. The data was collected in accordance with the design and by using the questionnaires of critical thinking disposition of Ricketts (2003) and academic engagement of Reeve and Tseng (2011) in two stages of before and after the execution of the program, and the data was analyzed by covariance analysis method. Findings of the research approved the significance of the effect of successful intelligence-based education on students' critical thinking disposition and academic engagement. According to this, the results suggest the possibility of applying successful intelligence-based education to enhancing critical thinking disposition and improving academic engagement of students.

Keywords: successful intelligence education, critical thinking disposition, academic engagement, students

1. Introduction

In today's world, with growing speed of science and technology evolutions, it is difficult to determine the actual literacy needed by future generation, and it seems that for getting along with current evolutions and achieving mastery over today's sophisticated and growing science, only having knowledge will not be a solution. But people should be able to think sharply, analyze critically, and produce creatively (Hajhosseini, 2016). In order to solve the problems in real life, today's learners should be able to move beyond the content of books and evaluate and analyze the available information (Ku, 2009). This leads the education organization to foster high-level mental functions; because problem solving requires critical and creative thinking, and consequently, it is necessary that learners become involved in their learning process as thoughtful activists, not mere information receivers. The concept of academic engagement, as an indicator of individuals' psychological investment in their learning process, suggests the learners' action level and direct effort in constructing concept and reconstructing their knowledge (Linnenbrink, Pintrich, 2003). In this regards, academic engagement is not considered only as a quantitative index (like score), but it is thought to include multiple cognitive, behavioral, and motivational dimensions, and hence its defenders such as Fredricks et.al(2004), Appleton et.al (2006) have identified three dimensions of cognitive, emotional and behavioral for academic engagement. However, in the upgraded pattern introduced by Reeve and Tseng (2011), in addition to these three components,

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Academic engagement also includes the component of functionality, and they point to the learners' self-directed and purposeful action in consciously targeting for their learning activity, continuous pursuit, getting feedback, and optimizing the pattern and method of their learning. According to this, the active learner is one who pays attention to task elements based on "behavioral component" and works on it with effort and perseverance. Based on emotional component, the active learner is interested in and enthusiastic about learning, and overcomes his/her anxiety, fatigue, and negative emotions, and he/she actively learns through his/her own learning strategies in the cognitive component. Above all, through the functionality component, the active learner monitors all his/her cognitive processes including the input, performance presentation, self questioning, revision and modification. According to the opinion of Reeve and Tseng (2011), these dimensions are interferingly present at the time of active learning and make the learners involved in their learning process.

Due to the learners' active involvement in their learning process, this learning method emphasizes on evaluation, criticism, revision, and continuous modification, and consequently it depends on the critical thinking disposition. According to Brookfield's opinion (2013), activist training methods, through activating the learner in learning process, lead to training, practicing and strengthening critical attitudes of individuals and direct them to revision and fair judgment. Ricketts (2003), Brookfield (2013), Paul (2004), Nelson (2003) and Fisher (2006), emphasizing on active methods such as discussion, brainstorming and problem solving, believe that with the aid of these training methods, students can become more involved in their learning process, and it is possible to enable high-level thinking tendencies in them instead of emphasizing on memorizing the information. In "nurturing thought" book, Siegel (1991) states that education can lead to strengthened critical tendencies of individuals. Sternberg (2002) emphasizing on limitation of traditional education in applying and nurturing high intellectual functions, attributes that limitation to the intelligence-limited perception which is considered as the general capability of using memory. However, he believes that intelligence, as the sum of high-level intellectual functions, is the result of practical experience of analysis, creativity and practice in life context, and intelligent efforts of individuals in problem solving is the largest educational platform for nurturing that. According to Sternberg's opinion, such education that is able to direct individuals to comprehensive subject analysis through problem statement, provide the opportunity for addressing all strategies and creative strategies, and makes revision, evaluation and modification possible, and it can strengthen high-level thinking tendencies in addition to achieving success. Therefore, based on his comprehensive concept of intelligence, Sternberg (2002) describes it as including a combination of functions required for achieving success in life. In successful intelligence theory, Sternberg believes that contrary to traditional intelligence theories which introduce it as a single structure, intelligence includes a combination of analytical, creative, and practical abilities that help individuals to adapt, select, and shape the environment, and thereby, in addition to achieving goals and success, it leads to proper compatibility with social-cultural context of life. According to this theory, such successfully intelligent people represent a balance of these three kinds of ability. Successfully intelligent learners analyze, criticize, evaluate, contrast, and compare the contents due to their analytical abilities. They apply their creative abilities including creating and discovering new ideas, imaging, recommending and predicting for selecting and presenting appropriate strategy, and due to their practical abilities, they use their formal and informal learning in life context at the time of facing a problem and solving it, and finally they succeed (Sternberg and Grigorenko, 2007). In addition, according to this viewpoint, those people are more intelligent that apply evaluation and criticism power in self-awareness, monitoring and improving their strengths and improving their weaknesses. Through gaining recognition of their ability patterns, they recognize their strengths and weaknesses, nurture strengths and improve weaknesses, and finally achieve success (Sternberg, Jarvin, Grigorenko, 2009).

However, in most educational programs, the presented problems are only a practical example of a situation for using the previously learned knowledge. In these methods, only some low-level functions of analytical intelligence are relied on, and high functions such as criticism and evaluation which are practically necessary for solving real problems in life context, are neglected (Sternberg, 2002). According to Sternberg's opinion, achieving success in learning requires a balance between analytical, creative and practical abilities, and hence successful intelligence-based education includes a set of contextualizing measures organizing activities, contents, and action strategies during class work which nurture problem solving skills (like problem identification, hypothesis analysis, resources and strategies allocation, presenting solution, monitoring and evaluation), creative thinking (like creating new hypotheses, creating and developing new ideas) and critical thinking (like identifying hidden aspects, wrong assumptions, and inappropriate strategies) through providing intellectual functions (like asking question, analyzing, assessing, comparing, criticizing and evaluating) and continuous practice of cognitive skills

(like representation, illustration, arranging and organizing information). However, Sternberg, Grigorenko (2007) do not present a definite example of a practical model for designing an educational pattern guiding successful intelligence. Rather, they believe that in every structure and content, education should enhance the students' activism with relying on high-level intellectual functions, and thereby help to revising and solving the problem. Therefore, in every educational subject, every teacher can state problem and make the students apply and practice the intellectual functions for successful intelligence in accordance with real life context and the students' educational experiences. In other words, successful intelligence-based education approach is not a definite pattern, rather the education based on this approach can take place by different methods such as problem solving, group discussion, group discovery, cognitive puzzles and team games, and the variety of these methods provide the opportunity for students with different interests to become involved and learn the contents in their preferred method fitting their abilities. The teachers should also direct questioning, discussion, searching, making hypothesis, and concluding by providing a wide range of activities, and help the students to achieve success in different strategies (Sternberg, 2005).

The efficiency of this model has been investigated in some areas and fields. For example, Sternberg et.al (1999) indicated the effectiveness of successful intelligence-based education psychology on students' educational performance. Sternberg and Grigorenko (2001) indicated the effectiveness of successful intelligence-based education in teaching reading on students' educational performance and comprehension. Sternberg et.al (2006, 2009) investigated the application of successful intelligence as a method of strengthening and upgrading advanced basic knowledge exams in statistics and psychology and as a framework for development of measuring advances physics basic knowledge. According to their investigation, there was less differences between different peoples regarding educational progress in comparison with traditional exams. Aljughaiman and Ayoub (2012) used an enrichment program for developing analytical, practical, and creative abilities in primary school children, and students of successful intelligence group indicated a better performance in all the three abilities. Sternberg et.al (2014) investigated the previous successes in successful intelligence-based educational interventions in a larger scale and as the base of teaching language arts, mathematics and science. They showed that in a few cases, successful intelligence group students have a better performance than other groups. Also in Iran, in a research, Babaei (2016) approved the effect of successful intelligence-based education on critical thinking and ambiguity tolerance in students of teaching. Salami (2014) investigated the effect of successful intelligence education on critical thinking and self-efficacy; Aghababaei, Malekpoor, Kajbaf, Abedi (2015) investigated the effect of successful intelligence education on improvement of analytical, practical and creative abilities in gifted girls; Sherbafzadeh, Abedi, Yousefi, Aghababaei (2014) investigated the effect of successful intelligence education on educational motivation and academic engagement, and the results have shown the effectiveness of successful intelligence theory. However, in Iran, these researches have mainly focused on direct teaching of successful intelligence educational package in a structure free of educational content, or it has been presented in education content in the university as in the research conducted by Azadmard and Talebi (2015), and there was not found any research which specifically designs this model in a specific content and investigates its effectiveness. Therefore, in this research, successful intelligence based education has been selected with emphasizing different patterns in education of a specific content, and in order to implement this pattern, heavenly messages (Payamhaye Asemani) course of ninth grade was selected. In order to strengthen analytical, creative and practical abilities, the education was designed according to content of textbook of this grade.

2. Methodology

2.1. Research model

This research was experimental and based on semi-experimental design and unequal control group.

2.2. Population, sample and sampling method

Statistical population of this research included all secondary school girl students of Turkamanchai town in academic year 2016-2017. For sampling from an available school, ninth grade students who had been previously randomly divided into two classrooms were chosen; one classroom was considered as the experimental group, and the other was considered as the control group. The experimental and the control group included respectively 20 and 17 peoples.

2.3. Instrument

A: critical thinking disposition questionnaire: this questionnaire has been developed by Ricketts (2003) and is a self-report tool which evaluates the critical thinking disposition measure.

This questionnaire has three subscales and 33 items including innovation (11 phrases), cognitive maturity (9 phrases), and mind conflict (13 phrases), and it is formed based on five degrees Likert scale. In a study, Pakmehr and Mirdoraghi (2014) approved face, content, and factor validity of this scale. In this research, by Cronbach’s alpha coefficient method, reliability of this scale was obtained for whole questionnaire equal to 0.67, for cognitive and creativity component equal to 0.76, for innovation component equal to 0.64, and for mind conflict equal to 0.72.

B: Academic engagement questionnaire: this questionnaire was introduced by Reeve and Tseng (2011) and evaluates four components of cognitive, emotional, behavioral and functionality. It has 22 items and is formed based on seven degrees Likert scale. Reeve (2011) has reported the reliability of this tool equal to 0.82 by Chronbach’s alpha coefficient. Samavi and Ebrahimi (2015) approved factor validity of the questionnaire through a research, and by Chronbach’s alpha method, reliability coefficient was obtained for whole questionnaire equal to 0.87, for functionality involvement component equal to 0.81, for behavioral involvement component equal to 0.93, for cognitive involvement component equal to 0.87, and for emotional involvement component equal to 0.78.

Table1:Illustration of How Units in the Two Instructional Conditions Covered the Same Content for Students but With Different Instructional Approaches and Activities in the Language heavenly messages textbook of ninth grade

intelligence	Successful	traditional method (Memory)
Content		
The first six parts of heavenly messages textbook of ninth grade class		
Objectives		
Improving critical thinking disposition and academic engagement of students		
Time		
Each chapter contains two lessons, and each lesson was allocated 2 90-minute sessions		
Curriculum of each session		
1. Reviewing the previous session lesson		1. Explain the content by the teacher
2. Communicating with an imaginary friend outside the classroom and answering his/her questions		2. Answering student questions from the content of the course
3. Group discussion and presenting the conclusion by each of students		3. Preserve the content of the course by students
4. Using prior knowledge of students and Brainstorming method		4. Question from students about content
5. Using analytical and creative intelligence development techniques such as: comparison, evaluation, interpretation, assumption, and innovation		
6. Defining practical tasks and application of educational content in daily life		
7. Developmental evaluation and teacher feedback		

Table 2:Examples of the Analytical, Practical, and traditional method Activities Cited in Table 1

Analytical activity:

1. They students are asked to discuss the causes of what people do being aware of their harmfulness and sinfulness (like smoking, tongue sins), and state their analyses about their reasons.
2. The students are asked to compare the characteristics of a creator and a creation (like carpenter and table).
3. The students are asked to evaluate the influence of prophets on societies before and after them.

- The students are asked to write some of their beliefs and analyze how these beliefs come about.

Creative activity:

- The students are asked to answer the questions of an imaginary friend out of their religion (the questions are planned by the teacher).
- The students are asked to put themselves in prophets' place and talk about what they would say to people, and what would they invite people to?
- The students are asked to invent a method for informing and persuading one of their relatives about quitting one of their sins (such as talking behind others' back, mocking, etc.)
- Before presenting any content unit, using brainstorming method, prior knowledge of students is written on the board.

Practical activity:

- The students are asked to compare some of their actions with God's attributes during the week, and think about how much they are like their creators, for example, not talking behind others' back, or God's attribute of concealing others' faults.
- The students are asked to make a note of some of wrong actions which they could do, but did not such as talking behind others' back, swearing, lying, etc. and write their reasons.
- The students are asked to write some of their actions which they do for having a better life (such as education, communicating with good friends, etc.) and state their relationship with their own religious beliefs.
- The students are asked to specify a religious topic about which they have questions, and every group should review its members questions and select a good question in the group, and declare the resources available to them (such as (including teacher, book, theologian, Internet). For the next session, everybody should find an answer.
- The students are asked to inform one of their relatives about one of their wrongful actions and write their reaction.

traditional method activity:

- The students are asked to Explain influence of prophets on societies
- The students are asked to Explain the division of the attributes of God
- The students are asked to Explain Causes of weakness in the faith and practice of some individuals

3. Research findings

The data collected were analyzed in two levels through descriptive statistics indexes (mean and standard deviation) and inferential statistics.

Table3. Mean and standard deviation of the research variables in pretest and posttest of groups

Variab	Group stage	experimental		control	
		mean	Standard deviation	mean	Standard deviation
critical thinking disposition	Pre-test	118.5	8.92	120.47	11.04
	post-test	131.40	7.4	122.058	11.67
academic engagement	pre-test	101.01	18.97	99.11	20.41
	post-test	125.55	15.31	100.64	20.75

According to table3, in pretest stage, the means of the mentioned variables in experimental group and control group were not so different. However, in posttest stage, there was a clear difference between the means of these variables in the two groups. In order to investigate the significance of the difference observed between the pretest and posttest, pre-assumptions of covariance analysis were studied. Results of skewness and elongation in the interval of (-0.2 to 0.2) showed that the scores of both groups have normal distribution, and homogeneity of variances was studied by Levene's test, and the results showed that significance level of Levene's test in the groups is more than 0.05

($p > 0.05$). In conclusion, it can be stated that the variances of the Experimental and control groups are homogeneous, and also correlation of the variables with each other was less than 0.8. F test was used to study the homogeneity of regression slope in the variable of critical thinking disposition ($p > 0.05$). Therefore, pre-assumptions of covariance analysis are confirmed. Due to this assumption's being unconfirmed ($p < 0.05$) in the variable of academic engagement, T-test was used for the two independent groups.

3.1. Findings Related to First Hypothesis

The first hypothesis of the study posited that there was a statistically significant difference in favour of the experimental group between pre-test and post-test scores on critical thinking disposition compared to the control group.

Table4. Results of one-way analysis of covariance for the variable of critical thinking disposition

Sources	mean square	df	F	sig	Eta
group	1089.305	1	9.735	0.001	0.468
error	111.895	34			

According to table4 and the significant F observation (9.735) obtained in the groups differences section in the dependant variable, we can say that after removing the effect of pretest, the difference between the two groups at the level of ($p < 0.05$) were significant, and therefore, the difference of critical thinking disposition scores of the subjects in the posttest, originates from the effect of successful intelligence theory based education. The effect measure shows that 46 percent of this difference is a result of applying independent research variable on the experimental group.

Table5. The mean of subscales of the variable of critical thinking disposition in pretest and posttest

Group	Stage	Innovativeness	cognitive Maturity	Engagement
Experimental	Pre-test	40.90	26.45	51.20
	Post-test	46.20	27.95	57.25
Control	Pre-test	42.05	26.47	51.94
	post-test	42.58	27.17	52.29

According to table5, the means of the experimental and control groups in pretest are very close in all subscales, and there is no difference between them. The mean of the experimental group in posttest, has been more than the mean of control group regarding the subscales of innovation and involvement. However, in the subscale of cognitive maturity, there is not so difference.

3.2. Findings Related to Second Hypothesis

The second hypothesis of the study posited that there was a statistically significant difference in favour of the experimental group between pre-test and post-test scores on academic engagement compared to the control group.

Table6. Statistics of t-test, comparison of pretest and posttest of the experimental and control groups in the variable of academic engagement

Variable	stage	t	df	sig	mean Difference	std.error Difference
academic engagement	Pre-test	0.306	35	0.761	1.9823	1.4376
	post-test	4.192	35	0.001	24.9029	5.4449

According to Table6, the level of significance in the pretest is larger than 0.05 ($p > 0.05$). Therefore, it can be concluded that there is not any significant difference between the scores of pretest in experimental and control groups. Also, regarding the level of significance in the posttest ($p < 0.05$), it can be concluded that there is a significant difference between the scores of posttest in experimental and control group. In other words, successful intelligence based education has influenced the increased academic engagement of students, and the research hypothesis is confirmed.

Table7. The mean of subscales of variable of academic engagement in retest and posttest

Group	Stage	agentic	behavioral	cognitive	emotional
Experimental	Pre-test	23	22.75	37.1	18.25
	Post-test	29.45	28.20	45.5	22.40
control	Pre-test	22.35	22.45	38	17.29
	post-test	22.70	23	38.35	17.58

According to table7, the means of experimental and control groups in the pretest are very close in all subscales and there is not any difference between them. However, in the posttest, the mean of experimental group has become more than the mean of control group in all the subscales.

4. Discussion and Conclusion

The current research was aimed at identifying the effect of successful intelligence-based education on students' critical thinking disposition and academic engagement, and the data analysis showed that successful intelligence-based education method has been effective in both variables of critical thinking disposition and academic engagement of students. In the first line, the findings showed that successful intelligence based education had led to a significant difference of students' scores of critical thinking disposition in the posttest compared with the pretest, and this difference which was particularly observed in comparison with the other group which was taught by the traditional method, indicates that successful intelligence-based education can enhance the students' critical thinking disposition. These findings are similar to the results of researches conducted by Babaei (2016) and Negahban Salami (2014), and for its explanation, we should say that nowadays, it is believed that thinking and learning skills can be taught and learned. Researchers of the field of study of intelligence and thinking have also emphasized on intelligence education in different educational levels including primary school, high school, bachelor, and even master programs (such as Sternberg, 2014; Deary, 2014; Mackintosh, 2014). One of these thinking skills which has been paid attention in recent years, is critical thinking and the disposition towards it, because due to the dynamic and wide nature of knowledge, the learners should be able to acquire the power of criticizing, reviewing, evaluation, and critical thinking to have the ability of addressing new issues or responding, evaluating, and selecting from among a variety of options.

In this regard, according to Facione (2010), in order to enhance critical thinking disposition, it is required to develop analyzing, systematic quality, self-confidence, open-mindedness, curiosity, and searching for truths in individuals. According to this description of critic individuals and definition of critical thinking, successful intelligence theory can develop these attributes and change the peoples' imaginations. Sternberg (2007) defines analytical intelligence as one aspect of successful intelligence which emphasizes on developing skills of analysis, assessment, comparison, criticism, and evaluation of students, and in order to upgrade the ability of problem solving and the mentioned skills, Involves students in assignments which require using these skills (definition and recognition of problem, resource allocation, presentation and organization of information, setting a strategy, monitoring problem solving strategy, evaluation of solution). On the other hand, creative ability of students is developed by assignments involving redefining problem, questioning, analyzing assumptions, presenting creative ideas, tolerating ambiguity, revealing real interests, delaying satisfaction, taking reasonable risks, presenting a creation pattern, self-efficacy, and revealing real interests. Also, by paying attention to peoples' strengths and weaknesses and nurturing or improving them, this theory and variety of educational programs lead to enhanced self-confidence of students. As a result, upgrading analytical and creative ability and growing self-confidence of students can be a platform for creation of critical thinking disposition in them.

Also, study of means of the three subscales of critical thinking disposition variable shows that in the experimental group, the mean of the two subscales of innovation and mind conflict has increased following applying the independent variable, but the mean of subscale of cognitive maturity does not indicate a significant difference. Increased subscales of innovation indicate the students' disposition to intelligent and creative curiosity for discovering new facts. One aspect of successful intelligence is development of creative thinking which provides the students with the opportunity of expressing new ideas besides nurturing analytical intelligence, and by presenting creative assignments and respecting the students' ideas, it enhances their disposition toward new innovations and curiosity. Increased subscale of mind conflict indicates the enhanced readiness of students for reasoning and predicting situations which require reasoning, and also it shows the confidence in one's own abilities in this regard. This result is in line with the objectives and successful intelligence-based educational program, because as it was mentioned in the objectives of the educational pattern, enhancing self-confidence, nurturing strengths, improving weaknesses, and group discussions and analyses were included in multiple assignments of successful intelligence educational pattern, and consequently it has led to growing power of reasoning and self-confidence in students.

The subscale of cognitive maturity indicates the individuals' openness to criticism and the extent to which they can understand the complexities of actual issues, and regarding their recognition of their own and others' knowledge, to what extent they are able to accept others' viewpoints. In this subscale, a significant difference was not observed, whereas it was expected for this subscale to increase, because growing analysis power of students was included in multiple assignments and group discussions in educational programs. One of its reasons might be the limited time of education, and the other reason might be adolescence age of subjects and the sensitivity of this age group to be criticized. Based on the viewpoint of growth theorists (Berk 2007), in this age, the adolescents have personal legends and imaginary spectators for them; in other words, they consider themselves very good persons and think that they are subject to a lot of attention, and perhaps this lowers their openness to criticism.

In the second line, the findings showed that successful intelligence-based education has caused a significant difference in students' scores of academic engagement in the posttest compared with the pretest, and particularly in comparison with the other group which were taught by traditional method, this difference suggests that successful intelligence-based education can make the students more involved in their educational process. These findings were homogenous with the results of research conducted by Sherbafzadeh et al. (2014), and as an explanation, we should say that the mentioned educational method has been able to raise the students' efforts in the direction of their targeted educational activity and direct them to active participation in their learning process by providing targeted mental challenges. Because according to Reeve and Tseng (2011), academic engagement is defined as the structure, behavioral and emotional recognition depending on the amount of the students' activities and their active participation in assignments and educational activities, and it is influenced by the type of educational activity, the assignments, and expectations created by education.

The findings of this research suggest the influence of successful intelligence-based education on every four aspects of academic engagement including functionality, behavioral, emotional, and cognitive, and therefore, it can be concluded that by using dynamic teaching methods such as group discussion, brainstorming method, and discussion and criticism in external imaginary situation, in the emotional aspect, this educational experience has attracted students' interests and has motivated them to become actively involved in their education process. Also in cognitive aspect, these methods have stimulated great cognitive functions, and through analytical thinking development techniques, they have made the students practice cognitive and meta-cognitive strategies. Also the variety of practical activities and emphasis on applying the educational content in daily life, has made the education close to the actual texture; and regarding the possibility of applying in life, it has directed academic engagement by assessing learning.

Continuous evaluation and information feedback received by it have also provided the students with the opportunity for more self-assessment, and thereby it has improved their activity in their own learning process. In addition, academic engagement is particularly dependant on functionality aspect, and it is expressed only when the assignments and challenges of learning can cause activation of high level thinking skills such as problem solving skill, evaluation, critical thinking, and creative thinking (Diperna, Volpe, Eliot, 2003; quoted from Schlechty, 2005). Whereas, Sternberg's successful intelligence theory also depends on these high level mental functions. Contrary to traditional intelligence theories which introduce intelligence as a single structure, this theory considers intelligence as a combination of intellectual, analytical, creative and practical abilities which help the peoples in adapting, selecting and shaping the environment for achieving goals regarding the socio-cultural context (Sternberg and Grigorenko, 2007).

According to this, also in this research, successful intelligence-based educational program has been able to make the students more involved in activity by providing different teaching and assessment methods such as project, article, objective works, rating and scoring, and it has made them involved in their education, assessment, and self-monitoring. This can lead to improvement of high level intellectual functions.

In fact, the infrastructural concept of successful intelligence theory presents a dynamic and self-organizing concept of intelligence which is constructed and developed in intelligent practices in the context and the resultant information. This theory is based on the belief that more intelligent people are able to better recognize their strengths and weaknesses by assessing and criticizing themselves, and the feedback information resulted from their performance. These strengths and weaknesses are widely related to three kinds of ability including analytical, creative and practical abilities in successful intelligence. So, these capabilities can develop the strengths and improve the weaknesses. In this way, successful intelligence is expressed and developed in the context of actual performance, assignments, challenges, and feedback information originating from successes. People always plan for the future success by using the recognition of their capability patterns (Sternberg, Jarvin, Grigorenko, 2009).

The current research has dealt with designing successful intelligence-based educational pattern on a specific content. Regarding the research conclusion and its effectiveness, it seems that this pattern can provide the students with the opportunity of actively learning, enhancing academic engagement, and improving critical thinking disposition. The education organization can benefit from successful intelligence method through training the teachers and improving education evaluation structures. Due to high flexibility of this method in designing, the teachers can also apply this method in their education structure, and help the students in raising their academic engagement and active thinking, including critical thinking.

References

- Aljughaiman, A. M., & Ayoub, A. E. (2012). The effect of an enrichment program on developing analytical, creative, and practical abilities of elementary gifted students. *Journal for the Education of the Gifted*, 35(2): 153–174.
- Aghababaei, S., Malekpour, M., Kajbaf, M.B., Abedi, A. (2015). The Effectiveness of Successful Intelligence Training on Analytical, Creative and Practical Abilities of Gifted Children. *Exceptional Children Quarterly*, 4(58), 37-44. (perstion)
- Azadmard, sh., Talebi, H. (2015). The effect of education on the basis of the successful intelligence on the teacher-student learning cognitive outcome in the educational psychology lesson. *educational psychology Quarterly*, 39(12), 199-223. (perstion)
- Appleton, J. J., Christenson, S. L., Kim, D. and Reschly, A. L. (2006). “Measuring cognitive and psychological engagement: Validation of the student engagement instrument”. *Journal of School Psychology*, 44(5): 427-445.
- Brookfield, S.D. (2013). *Powerful techniques for teaching adults*. San Francisco, CA: John Wiley. 271pp.
- Berk, L. E. (2007). *Development through the lifespan (4th ed.)*. Boston: Allyn and Bacon.
- Babaei, A. (2016). The impact of successful intelligence on students' critical thinking and tolerance of ambiguity. *Fundamentals of Mental Health*. 3, 380-388. (perstion)
- Deary, L. J. (2014). Teaching Intelligence. *Intelligence*, 42, 142-147.
- Facione C, Facione A. *Critical thinking what it is why it counts?* California Academic Press; 2010.
- Ku, K. Y. L. (2009). Assessing students' critical thinking performance: Urging for measurements using multi-response format. *Thinking Skills and Creativity*, 4: 70–76.
- Fredricks, J.A., Blumenfeld, P.C., Paris, A.H. (2004). School engagement: potential of the concept, state of the evidence Review of *Educational Research*, 74, 59-109.
- Fisher R. *Education and Thinking*. Translated by ForoughKianzadeh. Tehran: Rasesh; 2006.
- Grigorenko, E. L., Jarvin, L., & Sternberg, R. J. (2002). School-based tests of the triarchic theory of intelligence: Three settings three samples, three syllabi. *Contemporary Educational Psychology*, 27, 167–208.
- Hajhosseini, M. (2016). The Effect of Teaching by Socratic discussion on Critical Thinking Disposition. *Applied Psychological Research Quarterly*, 6(4), 59-78. (perstion)
- Linnenbrink, E. A. and Pintrich, P. R. (2003). “The role of self efficacy beliefs in student engagement and learning in the classroom”. *Reading and Writing Quarterly*, 19: 119-137.
- Mackintosh, N. J. (2014). Why teaching intelligence? *Intelligence*, 42, 166-170.

- Negahban Salami, M. [The impact of successful intelligence training on critical thinking, self-efficacy and academic performance of students]. Dissertation. Kharazmi University, 2014. (Persian)
- Nelson WA. Problem Solving through Design. In: New Directions for Teaching and Learning. San Francisco: Josy Bass; 2003. P.39-44.
- Pakmehr, H., & Mirdrogi, F.(2014). Reliability, validity and factor analysis of Ricketts' Critical Thinking Disposition scales in high school. *Educational Measurement Quarterly*, 11(4), 33-53.(Persian)
- Paul R, Elder L. The Miniature Guide to Critical Thinking. Foundation for Critical Thinking 2004;
- Ricketts, J. C. (2003). *The Efficacy of Leadership Development, Critical Thinking Dispositions, and Students Academic Performance on the Critical Thinking Skills of Selected Youth Leaders*. Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy,
- Reeve, J., Tseng, C. (2011). Personal agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, 36, 257-267.
- Sherbafzadeh, A., Abedi, A., Yousefi, Z., & Aghababaei, S.(2014). The Effect of Successful Intelligence Training Program on Academic Motivation and Academic Engagement Female High School Students. *International Journal of Psychological Studies*, 6(3), 118-128.
- Stemler S., Sternberg R. J., Grigorenko E. L., Jarvin L., Sharpes D. K. (2009). Using the theory of successful intelligence as a framework for developing assessments in AP Physics. *Contemporary Educational Psychology*, 34, 195-209.
- Stemler, S. E., Jarvin, L., Grigorenko, E. L., & Sternberg, R. J.(2006). Using the theory of successful intelligence as a basis for augmenting AP exams in Psychology and Statistics. *Contemporary Educational Psychology*, 31(3), 344-376.
- Siegel H. *The general ability of critical thinking*. Educational Philosophy and Theory 1991, 23(1): 18-19.
- Sternberg, R. J., Grigorenko, E. L., Ferrari, M., & Clinkenbeard, P. (1999). A triarchic analysis of an aptitude-treatment interaction. *European Journal of Psychological Assessment*, 15(1), 1-11.
- Sternberg, R. J., Grigorenko, E. L., & Jarvin, L. (2001). Improving reading instruction: The triarchic model. *Educational Leadership*, 58 (6), 48-52.
- Sternberg, R. J., Jarvin, L., Naples, A., Stemler, S.E., Newman, T., Otterbach, R., Parish, C., Randi, J., Grigorenko, E.L. (2014). Testing the Theory of Successful Intelligence in Teaching Grade 4 Language Arts, Mathematics, and Science. *Educational Psychology*. 106(3):881-899 .
- Sternberg, R. J. (2014). Teaching about the nature of Intelligence. *Intelligence*. 42. 176-179.
- Sternberg, R. J. (2005). The theory of successful intelligence. *Journal of Psychology*, 39, 189 -202.
- Sternberg, R. J., Jarvin, L., & Grigorenko, E. L. (2009). *Teaching for wisdom, intelligence, creativity, and success*. Thousand Oaks, CA: Corwin.
- Sternberg R.J. Raising the achievement of all student: Teaching for successful intelligence. *Educ Psychol Rev* 2002; 14: 383-93.
- Sternberg, R. J., & Grigorenko, E. L. (2007). *Teaching for successful intelligence: To increase student learning and achievement* (2nd ed.). Thousand Oaks, CA, US: Corwin Press.
- Schlechty, P.C. (2005). *Creating great schools: six critical systems at the heart of educational innovation*. San Francisco: John Wiley and Sons.
- Samavi, A., Ebrahimi, K.(2015). Relationship between Academic Engagements, Self-efficacy and Academic Motivation with Academic Achievement among High School Students in Bandar Abbas. *Cognitive Strategies in Learning Quarterly*, 7(4), 71-92.(Persian)