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Effectiveness of the Growth Mindset Intervention on Learning Behaviors in the Middle School Gifted Underachievers

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Abstract

Studies have shown that self-beliefs about intelligence and abilities play an important role in learning and academic achievement at school. A growth mindset is of particular importance for gifted students for the reason that they are at risk of both perfectionism and underachievement, which might deter them from actualizing their potential. This study considers the impact of using a growth mindset intervention during an eight-week course for gifted underachieving students. Learning behaviors were measured pre-course, post-course and three months post-course with LBS (Learning Behaviors Scale by McDermott, 1999). It was hypothesized that the experimental group who took part in the growth mindset workshop would improve their learning behaviors. The results of ANCOVA and repeated measures ANOVA showed that the mean difference between the dimensions of learning behaviors including competency motivation, attention/persistence, attitude toward learning and strategy/flexibility in the three stages of the research (pre-test, post-test, and follow-up) was significant ($P < 0.05$). Based on this finding, the growth mindset intervention can be utilized as an appropriate method to improve the learning behaviors of underachieving gifted students.

Keywords: Learning behaviors, Growth mindset intervention, Underachieving gifted students

Introduction

One of the most popular mistaken beliefs about working with gifted children is that they are easy to be dealt with since all gifted children are good students. Actually, working and dealing with such students can be as equally challenging as working with other groups of students, and sometimes, can be even more challenging (Stanley, 2018).

Some gifted students do not have a successful performance at school, and even with high levels of intelligence, measured by cognitive tests, they are still susceptible to motivational distortions and underachievement (Carlson, 2018). Underachievement is one of the issues that has attracted the attention of researchers in relation to students in general and gifted students over the past decades, in particular. Many of today's experts argue that it is not easy to provide a comprehensive definition of underachievement, and the problem of each of these students can be uniquely investigated. Most researchers approved that underachievement was associated with an incongruity between expected and actual performance (Clark, 1992; Davis & Rimm, 1998, Dowdall & Colangelo, 1982; Emerick, 1992; Lau & Chan, 2001; McCoach & Siegle, 2003; Reis & McCoach, 2000; Rimm, 1997; Seely, 1993; Supplee, 1990; Stoeger & Ziegler, 2005; Whitmore, 1980). In almost the last three decades, researchers conducted several studies to respond to teachers, parents, and psychologists dealing with this confusing and disturbing issue (Abu-Hamour and Al-Hmouz, 2013). In general, the findings of these researchers can be divided into two categories, namely individual and environmental factors (including family and school-related factors). The research revealed that various individual factors play an important role in the underachievement of gifted students. Emotions, motivation, and learning behavior are the intensively discussed predictors of underachievement (Obergriesser & Stoeger, 2015).

Adelodun (2014) maintained that underachievement is primarily a behavior; therefore, it can change over time. Underachievement might arise from different factors like students' attitudes towards themselves and their school. Besides, due to the lack of study skills and self-regulation, some students might become academically unsuccessful. Thus, underachievers have no effective learning behaviors in class and academic situations.

Learning behaviors are defined as observable patterns of behavior that students display as they attempt and undertake school learning tasks (Yen et al., 2004). According to McDermott, Leigh, and Perry (2002), students with adaptive learning behaviors were more flexible and thoughtful in their thought processes, more strongly motivated, and reacted well to innovation or error. Listening attentively, thinking before responding, awareness of the use of time, and sitting silently are also instances of positive learning behaviors (McDermott, 1999). Students displaying these learning behaviors have a propensity for participating more actively in class, trying harder, and acting cooperatively and accepting more corrections. Positive attitudes towards learning are also commonly included in learning behaviors (Hahn, Schaefer, Merino, & Worrell, 2009). However, these positive learning behaviors are seldom manifested in underachieving gifted students.

One of the theories that have been proposed for motivation and learning behaviors is the theory of growth mindset. Numerous studies were conducted on growth mindset and intrinsic motivation in learning in the 21st century. The constructs of motivation and mindset were especially important for educators attempting to positively influence students' learning and outcomes (Ng, 2018). Mindset theory, as a socio-cognitive model, displays the manner in which fundamental beliefs about self can be changed into strong motivational processes involved in constructing major patterns of cognition and affecting behavior in young individuals (Dweck & Leggett, 1988). Dweck (1999) investigated the reason why some students enjoyed learning, though it was difficult, while others were nervous or reluctant to perform challenging tasks (Rhew et al., 2018). The theory explains how various meaningful systems and succeeding self-regulatory processes are formed in achievement situations, with reference to a person's beliefs about the fixed or flexible nature of intelligence, character, and personality (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2012; Dweck & Molden, 2005). The belief that intelligence is fixed dampened students' motivation to learn, made them abandon effort and quit after a setback. This is why so many intelligent students stop working when school curriculum becomes hard. Many intelligent students find elementary school easy and coast to success early on. But later on, when they are challenged, they struggle. They do not want to make mistakes and feel dumb; besides, most of them do not want to work hard and feel dumb. So they simply abandon any attempt, and they might become underachievers.

Given the negative consequences of holding a fixed mindset, it is important to find methods of encouraging a growth mindset in students. Initially, as discussed in Dweck (2000), researchers proposed ways for successfully altering students' mindsets. Studies show that the growth mindset can be taught (Mueller & Dweck, 1998; Blackwell, Trzesniewski, & Dweck. 2007, Aronson, Fried & Good, 2002; Good, Aronson & Inzlicht, 2003; Kamins & Dweck, 1999). For instance, growth mindset behaviors can be encouraged by altering the praise given to successful students. Several studies have revealed that students praised for their intelligence ("you are smart at these problems") poorly reacted to a later failure, yet students who are praised for their effort ("you must have worked hard at these problems") favorably reacted (Kamins & Dweck, 1999; Mueller & Dweck, 1998).

The growth mindset can also be directly taught. Blackwell, Trzesniewski, and Dweck (2007) taught the growth mindset to middle-school students by means of readings and discussions about the neural connections formed in the brain by hard-working and continuous processing. Before the intervention, students' math grades were steadily decreasing; however, their grades significantly improved after the intervention. Aronson, Fried, and Good (2002) reported similar results in an interventional study for college students.

Growth mindset interventions potentially increase students' motivation and performance. Therefore, recent studies reported methods of online teaching of the growth mindset. Brainology, an online interactive program based on the Blackwell intervention, teaches students the scientific foundation of the growth mindset by means of readings and interactive exercises. Paunesku et al. (2015) investigated the efficacy of an online growth mindset intervention including reading and writing exercises during two 45-minute

sessions, and reported that students' grades in main academic courses increased, compared with the control group. Teaching middle school students about the brain and study skills promoted their beliefs about the flexibility of intelligence, willingness to learn, and their math scores (Blackwell, Trzesniewski, & Dweck, 2007).

Students are commonly taught, in a growth mindset intervention, that the brain is a dynamic, flexible organ and, similar to a muscle, grows with hardworking and attempting to learn new things. Considerable emerging evidence, commonly obtained from multiple randomized controlled trials, revealed that interventions that aim at academic mindsets, viewpoints, and beliefs about the nature of ability and the final outcome of the effort might result in enhanced academic outcomes determined by the changes in students' viewpoint about academic work and increased academic effort (Farrington et al., 2012; Snipes et al., 2012; Snipes, & Tran, 2017; Yeager & Walton, 2011). The rationale behind interventions that aim to develop positive academic mindsets is that such interventions might change students' beliefs about academic ability, their own capability for success, and the outcome of academic hardworking. The logic model proposed by Farrington et al. (2012) assumes that the academic mindsets of students result in academic diligence and thus academic behaviors, such as attending class, being attentive in class, completing assignments, and studying.

More involvement in academic behaviors, in turn, leads to improved academic outcomes, such as higher grades and test scores (Farrington et al., 2012; Snipes et al., 2012; Yeager & Walton, 2011; Snipes, & Tran, 2017). In teaching students, the skills to develop growth mindset, educators need to attempt to alter the students' mindset through informing them about the scientific rationale behind brain plasticity and its growth potential (Hatcher, 2018; Yeager & Dweck, 2012). As stated by this theory, modifying students' beliefs leads to the increased academic effort and success. The increased experiences of academic success reinforce and strengthen their newly established beliefs about the developmental nature of ability, in that way, their continued involvement in academic behaviors and the perpetuation of this positive cycle reinforce (Cohen, Garcia, Apfel, & Master, 2006; Farrington et al., 2012; Snipes et al., 2012, Snipes & Tran, 2017).

Compared to the population of general students, gifted and talented students more probably are instances that support the idea that intelligence is flexible (Mofield & Parker, Peters, 2018); however, gifted students' mindset beliefs greatly vary. Dweck (2012) has recently proposed that gifted students might be at risk of forming fixed mindsets. She hypothesizes that this might be the result of the giftedness label and/or being praised for their intelligence by teachers and parents (Dweck, 2007). A growth mindset is of particular importance for gifted students for the reason that they are at risk of both perfectionism and underachievement, which might deter them from actualizing their potential (Esparza et al, 2014).

Mindset is a factor that might result in underachievement problems seen in some of the gifted students. In the case of Iran, Iranian gifted students are separated from other students at middle school and educated in special schools for gifted so they are at risk of fostering a fixed mindset, especially when they get low grades.

Studies revealed that teaching students in the general population about growth mindset will help them to alter these conditions (Dweck, 2000; Shumow & Schmidt, 2013), yet

not much information is available about the mindsets of gifted students or about the way gifted students react to the educational programs developed to promote the growth mindset (Esparza et al., 2014). Since no study has been conducted in Iran to investigate the effect of psychological interventions on underachieving gifted students, the present study aimed to investigate the effect of the growth mindset intervention on the underachieving gifted student's learning behaviors. In this study, the efficacy of Dweck's mindset theory and that of the growth mindset intervention were investigated with regard to the learning behaviors of the gifted underachieving students in class.

The aim of this study is to investigate the growth mindset, as an intervention, for middle school gifted underachievers and to find its effectiveness in their learning behaviors. The research question was: Is there any significant difference in learning behaviors of middle-school gifted underachieving students who participate in the growth mindset intervention and those who do not?

Methods

The purpose of this quasi-experimental pre-test, post-test and follow-up study was to investigate the effects of a growth mindset intervention on seventh, eighth and ninth grade gifted underachieving students' learning behavior.

The study took place at a middle school that was especially for gifted education in Qazvin province, Iran, and comprised of 280 students, all of whom were boys. The participants should be eligible to enter into the experiment so the first-time underachieving students were identified. As it was mentioned before, underachievement arises from the discrepancy between academic performance and intellectual potential. In the present study, two methods were used for selecting the underachieving gifted students after their enrollment in the gifted school. In the first method, the academic performance was observed by the teacher and second, the academic success questionnaire was completed by the students, parents and teachers. In order to conduct the first method, three groups of teachers (math, language, and science teachers) were asked to rate the academic performance of their gifted students in the classroom as excellent, expected, or lower than expected. The second method was carried out by distributing the academic success questionnaire to all the students of the gifted school. The questionnaire which was designed for identifying academic underachievement includes three parts, namely students' view (e.g., their idea about academic status, academic satisfaction, academic success perception, and academic buoyancy), the teachers' view about the degree of student academic success and the parents' view about the degree of students' academic success.

The students who received poor grades from the academic success questionnaire and also their academic performance was determined lower than the performance expected by the teachers were selected and invited to participate in the interventions held by a psychologists' team in their school (without knowing the purpose of the intervention and the reason for their selection). Volunteered students constituted the final sample group. They were assigned to experimental and control groups. The control group comprised 12 students; five of them were in grade seven (41%); three were in grade eight (25%) and

four were in grade nine (33%). The experimental group included 12 students; three of them were in grade seven (25%); four were in grade eight (33%), and five were in grade nine (41%).

Three psychological scales were filled in at school, once a week before students attended the intervention, also on the final day of the intervention and three months later (after summer vacation).

Academic Success Scale*:* This scale which was developed by Salehi (2013) includes 30 items with two dimensions and seven subscales. The two dimensions are objective success (grade point average, students' view, teachers' view, and parents' view of the students' academic status) and subjective success (academic satisfaction, academic buoyancy, and academic success perception). The model fit index showed that this model is acceptable and valid. The internal consistency of the scale, calculated by the Cronbach's alpha coefficient, was 0.79 for the students' view, 0.74 for the teachers' view, and 0.72 the parents' view, and for the subjective dimension, the Cronbach's alpha coefficient for the buoyancy was 0.70, for satisfaction, it was 0.76, and for academic success perception, it was 0.85. The Cronbach's alpha for objective success was 0.82 and for subjective success, it was 0.85. To confirm the validity of the questionnaire items, the correlation of each item with the total score of each dimension was calculated which showed positive correlations of the items with each other and with the total score.

Learning behaviors scale: McDermott (1999) reported on the development of the Learning Behaviors Scale (LBS; McDermott, Green, Francis, & Stott, 1999). The LBS comprises 29 items reflecting the aspects of a child's (age 5-17) response to learning tasks that can be readily observed by the classroom teacher such as, "Easily gives up tasks", "Responses showing lack of attention" or "Unwillingness to accept needed help". When completing the scale, a teacher selects whether a concept *most often applies*, *sometimes applies*, or *does not apply* to child behavior. Using factor analysis, four constructs were found to underlie LBS scores: Competence Motivation, Attitude toward Learning, Attention/Persistence, and Strategy/ Flexibility. McDermott (1999) reported that these factors were uniform across variations in age, gender, ethnicity, social class, and family/community structures. Internal consistency estimates for the scores of each of the four factors were all above 0.75. In Iran, this scale was standardized by Abedi and Hadi pour (2013). These results confirmed the construct validity of the Learning Behavior Scale (LBS) for measuring the learning behaviors of middle school students. The reliability of this scale was also examined through test-retest, and the results showed that this scale has sufficient reliability.

Intelligence beliefs questionnaire*:* To investigate the intelligence beliefs, the questionnaire developed by Dopeyrat and Marine (2005) was used. This questionnaire consists of 9 items that measure the two components of entity intelligence beliefs and incremental intelligence beliefs. Cronbach's alpha coefficients for the intrinsic and incremental intelligence belief subscales were 0.72 and 0.73, respectively, indicating appropriate reliability of these subscales.

The participants were divided into two groups. Teachers completed LBS and the students completed the intelligence beliefs questionnaire in the pre-test. The experimental group participated in an eight-week intervention (one session per week, as explained in

Table 1). After the end of the intervention, the LBS scale was completed again by the teacher and the intelligence beliefs questionnaire by the students, as the post-test. About three months later (after summer vacation), the LBS scale and the intelligence beliefs questionnaire were re-administered in the follow-up phase of the study. This data was analyzed by repeated-measures analysis of variance (ANOVA) and analysis of covariance (ANCOVA) through SPSS and the results were as follows.

The intervention was carried out during eight sessions of 20 to 30 minutes (one session per week), beginning in the spring term of seventh, eighth and ninth grade. Table 1 provides an overview of the eight-session intervention protocol.

Table1. Content of intervention sessions

	Sessions Experimental group	**time**
1	Completing Implicit Theories of Intelligence Scale – Self Form (Dweck, 2000). Indicating mindset of each participant by himself.	30 minute
2	What is mindset? And what is its consequences in our behavior, emotions and beliefs.	30 minute
3	Growth mindset= success : A report about famous persons who had growth mindset, persistent when faced with setbacks and achieved major successes, like Michael Jordan, Albert Einstein, Steven Paul Jobs, Walter Elias "Walt" Disney and Avicenna. And discussion about their biographies.	30 minute
4	Reading an article about Brain plasticity: "You can grow your intelligence; New research shows that the brain can be developed like a muscle" http://www.brainology.us/websitemedia/youcangrowyourintelligence.pdf)	30 minute
5	Brain Basics Basics of brain structure & function, particularly what is required to maintain readiness to learn	30 minute
6	Brain Behavior Brain behavior, how it functions, effect of emotions and strategies to manage emotions	30 minute
7	Brain Building How learning changes the brain and what sorts of activities promote learning	30 minute
8	Brain Boosters How memory works and study strategies to apply these lessons in real life.	30 minute

Students in the experimental group participated in the structured intervention, which included instruction in the physiology of the brain and study skills. Furthermore, through science-based readings, activities, and discussions, students in the experimental group were taught that intelligence is malleable and can be developed; students in the control group received no intervention but the same intervention was carried out for them after the end of the study. The key message of the intervention was that learning changes the brain by forming new connections and that students are in charge of this process. This message of malleable intelligence was presented in the context of an interesting reading, which contained vivid analogies (e.g., of muscles becoming stronger) and examples (e.g., of relatively ignorant babies becoming smarter as they learned), supported by activities and discussions.

Results

Descriptive statistics of learning behaviors and their dimensions are reported in Table 2.

Table 2. Descriptive indexes of Intelligence Beliefs and Learning Behaviors and its dimensions in the experiment stages by groups

Variables	Groups	Pretest				Post test				Follow up			
		M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
Learning Behaviors (total)	Experiment	19,00	4,95	10	28	31,00	3,81	23	37	31,41	2,74	26	36
	Control	19,83	4,64	14	28	20,58	4,64	13	29	21,83	3,61	16	30
Competency Motivation	Experiment	6,25	2,26	2	9	11,91	2,19	9	16	11,75	1,91	9	15
	Control	6,91	2,77	2	11	7,08	2.87	2	12	7,66	2,53	4	12
Attention/ Persistence	Experiment	4,75	2,56	1	9	8,83	2,55	5	13	8.91	2,06	4	12
	Control	5,25	2,59	1	10	5,58	2,35	2	10	5,57	1,72	3	9
Attitude toward Learning	Experiment	3,50	1,83	0	6	4,66	1,61	2	7	4,91	1,31	3	7
	Control	3,41	1,72	0	6	3,58	1,24	1	5	4,08	1,08	2	5
Flexibility	Experiment	4,50	1,16	3	7	5,50	1,00	4	7	5,83	1,11	4	7
	Control	4,25	1,42	2	7	4,33	1,43	3	7	4,50	1,38	2	7
Incremental intelligence belief	Experiment	11,08	3,60	6	17	15,33	3,52	9	20	15,25	3,30	10	20
	Control	10,33	4,35	5	18	10,08	4,33	5	18	10,33	3,98	6	18
Entity intelligence belief	Experiment	12,33	4,24	7	19	9,33	2,96	6	13	9,01	2,44	7	15
	Control	12,00	3,64	6	18	12,50	4,46	6	20	11,91	4,83	6	19

In the following, the initial differences between the groups (in the pre-test stage) in the learning behavior variable and its dimensions were compared using independent samples t-test. The results of this test are reported in Table 3.

Table 3. Comparison of the mean scores of pretest between groups in the Learning Behavior and its dimensions

Variable	t	df	Sig	Mean difference	Effect Size
Learning Behaviors (total)	0.42	22	0.67	0.83	0.16
Competency Motivation	0.64	22	0.52	0.66	0.25
Attention/ Persistence	0.47	22	0.64	0.50	0.18
Attitude toward Learning	-0.11	22	0.91	-0.80	0.04
Flexibility	-0.47	22	0.64	-0.52	0.18

Based on the findings in Table 3, there is no significant difference between the mean scores of the experimental and control groups in the variable of learning behaviors and its dimensions in the pre-test.

In order to compare the differences between groups, ANCOVA was used. After controlling the effect of the pre-test, the difference between the experimental (growth mindset) and the control groups was compared in the post-test and follow-up stages, with regard to the total score of learning behaviors and its dimensions.

Table 4. Result of between group comparison of Learning Behaviors and its dimensions

Variable	Steps	Sum of Squares	df	Mean of Squares	F	Sig	Effect Size	Power
Learning Behaviors (total)	Post test	717.68	1	717.68	102.11	0.001	0.82	1.00
	Follow up	594.10	1	594.10	111.07	0.001	0.85	1.00
Motivation Competency	Post test	175.44	1	175.44	186.25	0.001	0.89	1.00
	Follow up	124.86	1	124.86	26.72	0.001	0.56	1.00
Attention/ Persistence	Post test	77.00	1	77.00	88.44	0.001	0.68	0.99
	Follow up	78.41	1	78.41	61.05	0.001	0.74	1.00
Attitude toward Learning	Post test	6.31	1	6.31	10.59	0.004	0.33	0.87
	Follow up	3.71	1	3.71	7.80	0.011	0.27	0.75
Flexibility	Post test	6.16	1	6.16	6.26	0.021	0.23	0.66
	Follow up	8.30	1	8.30	8.27	0.009	0.28	0.78

As shown in Table 4, after controlling for the effect of the pre-test, there was a significant mean difference between learning behaviors (total score) in the experimental and control groups in the post-test ($p < 0.001$). The results showed that 82% of the individual differences in the post-test were related to the difference between the groups. Also, after controlling the effect of the pre-test, there was a significant difference between the mean of learning behaviors (total score) in the experimental and control groups in the follow-up stage ($p = 0.001$). The results indicated that 85% of the individual differences in the follow-up stage were related to the difference between groups. Furthermore, in the post-test and follow-up stages, the mean of the dimensions of learning behaviors including Competence motivation scores, Attention/Persistence, Attitude toward Learning and Flexibility were significantly different in the experimental and control groups ($p <0.05$).

In order to compare intra-group differences (pre-test, post-test, and follow-up) in the experimental group, the repeated measures ANOVA was used.

Table 5. Result of within group's comparison in Learning Behaviors and its dimensions in the experimental group

Variable	Sum of Squares	df	Mean Square	F	Sig	Effect size	Power
Learning Behaviors (total)	11193.38	2	596.69	108.84	0.001	0.90	1.00
Competence Motivation	249.55	2	124.77	160.42	0.001	0.93	1.00
Attention/Persistence	136.16	2	68.08	38.24	0.001	0.77	1.00
Attitude toward Learning	13.72	2	6.86	15.70	0.001	0.58	0.99
Strategy/Flexibility	11.55	2	5.77	9.22	0.011	0.45	0.95

Based on the findings reported in Table 5, the mean difference of the learning behaviors (total score) in the three stages of the research was significant ($p = 0.001$) and 74% of the variances or individual differences were related to the differences between the three stages of the study and group membership.

Also, based on the findings in the above table, the mean differences of the dimensions of learning behaviors including Competence Motivation, Attention /Persistence, Attitude towards Learning and Strategy/Flexibility in the three stages of the study were significant ($p > 0.05$). Regarding the effect size, in each dimension, 93%, 77%, 58% and 45% of the variances or individual differences were respectively related to the differences between the three stages of the study.

Table 6. Result of between group comparison of Entity intelligence belief and incremental intelligence beliefs

Source	Variable	Sum of Squares	df	Mean of squares	F	sig	Effect size	Power
Group	**incremental intelligence beliefs**	238.34	1	238.34	15.73	0.002	0.81	1.00
	Entity intelligence belief	66.12	1	66.112	11.32	0.001	0.76	1.00

Finally, as shown in Table 6, growth mindset intervention for underachieving gifted students increased the experimental group's incremental intelligence beliefs and reduced the entity intelligence beliefs.

Discussion

In discussing this significant improvement in learning behaviors, it was found that the intervention promoted the growth mindset approach to learning. According to the results, the growth mindset intervention for underachieving gifted students increased the experimental group's incremental intelligence beliefs and reduced entity beliefs. These results are in line with Dweck's mindset theory. It should be noted that the growth mindset intervention also changed and reduced the entity beliefs of the experimental group. In explaining these findings, it can be stated that teaching Dweck's mindset theory can change the incremental beliefs of intelligence in underachieving gifted students and help them to believe that intelligence has a variable nature and that the desired academic results can be obtained through hard working and practice.

The purpose of this study was to determine whether a growth mindset intervention can influence the learning behaviors of the gifted underachieving students, including Competence Motivation, Attention/Persistence, Attitude toward Learning, Strategy/Flexibility. In order to measure the above-mentioned constructs, student's learning behavior in class was rated by teachers to capture the level at which the students exhibited positive or negative behavioral changes. The findings of this study showed that the learning behaviors of the experimental group students who participated in the growth mindset intervention showed positive and significant changes, in comparison with the control group, during post-test and follow-up stages.

Numerous studies found that students perform better if they believe that their intellectual abilities can be developed, a belief which is called growth mindset, than if they believe that their intellectual abilities are immutable, a belief which is called a fixed mindset. These results are roughly aligned with the findings of Dweck (2006, 2007, 2008,

2010) who stated that the theory of growth mindset can be taught and affects different behaviors, including student's learning behaviors. Instead, learning behaviors might be modified by skill instruction or training (McDermott, 1999), i.e., through modeling, games and structured activities (McWayne, Fantuzzo, & McDermott, 2004). It seems that growth mindset training can be used as a way to improve the learning behaviors of underachieving students.

Underachievement is closely linked to the development of self-concept. Children who think of themselves as an unsuccessful person, sooner or later, begin to put self-imposed limits on what is possible. Any academic success is taken as "flukes" and their low scores reinforce their negative self-perceptions. This self-deprecatory attitude evidently leads to comments like "why should I even try? I am just going to fail anyway", or "Even if I do succeed, people will say it is because I cheated". All these eventually end in low self-concept, and students consider themselves academically weak. By holding this assumption, their ability to change or to accept a challenge is limited. In brief, mindsets change the actual meaning of competence. By having a fixed mindset, competence is seen as an ability people simply have and demonstrate straightaway. If this ability does not work at once, they might lose their interest or become upset. However, by having a growth mindset, competence is seen as an ability that develops over time by effort and the gradual growth of competence paves the ground for developing pride, confidence, and interest (Dweck & Molden, 2017).

In this way, by shifting the mindset about intelligence and ability, competence motivations will also be changed and lead to more intrinsic motivations. This will make the students more motivated to attain competency in class and participate more actively in the classroom.

The finding of Attention/Persistence is aligned with the findings of Ayoub and Aljughaiman (2016) who showed that the growth mindset fosters persistence and resilience. In a study carried out in Scotland, students were randomly assigned to receive the Brainology curriculum for six weeks or to complete surveys before and after the program without being instructed. The performance of the experimental group significantly in the reading achievement test was significantly improved and they were more persistence when facing setbacks (Paunesku, Goldman & Dweck, 2011).

Previous studies reported that students who believe in the developmental nature of intelligence are more likely to persist when learning gets difficult and ask for support when they do not understand or need further explanation (Dunning, 1995; Hong et al., 1999; Nussbaum & Dweck, 2008). Students who have a fixed mindset are likely to avoid struggling situations because such situations challenge their sense of intelligence (Claroa, Pauneskub & Dweck, 2016) while students with a growth mindset more likely see the difficult tasks as a way to increase their abilities (Blackwell, Trzesniewski, & Dweck, 2007) and look out for challenging learning experiences that empower them to do so (Mueller & Dweck, 1998). Thus, students who have a growth mindset commonly get better scores than those with a fixed mindset (Blackwell, Trzesniewski, & Dwec, 2007; Romero, et al, 2014; Stipek & Gralinski, 1996), especially in the face of difficulty.

Different factors have been known to influence students' attitudes toward learning, yet the student's beliefs about their ability to learn are mainly dependent on their self-

concept. Gifted students with a fixed mindset are likely to be satisfied with their achievements and do not make an effort to do anything else. Besides, they might believe that if they are required to work hard to learn something, this shows that they are no longer intelligent. One study revealed that middle school students with a fixed mindset of learning were less motivated to learn while those with a growth mindset were motivated to learn more (Haimovitz, Wormington, & Orpus, 2011). As they develop a growth mindset, each learning situation will be an opportunity to become stronger and students will have a more positive attitude toward learning situations, although difficult. But if their beliefs about their abilities and intelligence are fixed, students think that they will have no chance for growth, so their attitude toward learning will be different. In the eyes of such students, the learning situation is a competition in which their present level of ability is the only aid to win or lose the competition, and they will be defeated in facing the challenges of learning if they fail to win. Therefore, learning situations can increase the risk of losing self-esteem and thus developing less positive attitudes. In such a situation, it appears that growth mindset intervention can enable these students to improve their attitude toward learning and learning from a fierce competition becomes an opportunity to become stronger.

Students who have a fixed mindset believe that their intellectual ability is limited, and they are worried about proving it instead of improving it. They are deeply concerned about their ability, and this can provoke, in the face of challenges and setbacks, destructive thoughts (e.g., “I failed because I’m dumb”), feelings (such as shame), and behaviors (admitting defeat). By contrast, students who have a growth mindset mostly see the same challenge or setback in an entirely different way, i.e., as an opportunity to learn. Thus they react with constructive thoughts (e.g., “Maybe I need to change my strategy or try harder”), feelings (such as the excitement of a challenge), and behaviors (perseverance). This mindset make it possible for students to surpass temporary setbacks to focus on long-term learning.

Many studies confirmed the importance of intelligence mindsets for academic persistence and performance. In accordance with the belief that they were able to develop their competence, after a failing a test, students with a growth mindset more frequently stated, "I would work harder in this class from now on" and "I would spend more time studying for the tests", which is perfectly sensible. Nevertheless, students having a fixed mindset, lacking the ability attributions and strongly over exposing deficiencies, mostly said, "I would spend less time on this subject from now on": "I would try not to take this subject ever again"; or "I would try to cheat on the next test". A fixed mindset shows students no good route to success. If students lack the ability and if more effort confirm it, only a few constructive strategies will be left at their disposal (Dweck & Molden, 2017).

Therefore, most of the students who have a growth mindset about intelligence and ability are likely to seek effective learning strategies and self-regulation after academic failure or when confronted with difficult educational tasks. So that they can utilize this strategy to improve their academic performance and achieve their goals.

Conclusion

although in previous studies, researchers have focused more on the definition, identification, causes, and descriptions of the characteristics and problems of underachieving students, what is most frequently asked in the current studies is how and what kind of interventions can reverse underachievement and help underachieving gifted students to reach the desired level of achievement that they had the potential to achieve.

The present study investigated the efficacy of the growth mindset intervention on gifted underachieving students while most previous studies focused on students in regular education. Although more research is needed to repeat such interventions and to arrive at a firm conclusion, based on the findings of the present study, it seems that growth mindset intervention can be utilized as an appropriate method to improve learning behaviors of underachieving gifted students and help them to be academic achievers. However, we know that underachievement, as a complex academic phenomenon, necessitates individualized interventions and counseling methods that focus on underachievement as a personal and unique problem which should be considered more in further research.

Mindset portrays a collection of beliefs that can explain the way gifted students might fulfill their potential (Esparza et al., 2014). Students having a growth mindset more probably look for opportunities to learn, move beyond the requirements, explore learning opportunities both in and out of class, take on and persist in the face of challenges, and use both study strategies and feedback to improve. A belief that intelligence was flexible and that it could be increased by effort resulted in a desire for learning. Here, the obstacles were regarded as a natural part of learning (Dweck, 1999).

Studies on learning and brain, related to the fields of neuroscience and education, and reported findings that are vitally important for schools in the last decade. The first is *brain plasticity* (implying that intelligence and ability grow with practice and effort). The second is *the importance of students' mindsets for learning* (if students believe that ability can grow, their achievement considerably improves) and the third is *the effects of ability grouping on all its different forms* (these grouping practices impart damaging fixed mindset beliefs to students) (Boaler, 2013).

When ability grouping forms, whether students are informed about the grouping and its benefits or not, students' beliefs about their own potential modify by the groups they are assigned to. In Iran, despite the concerns of some parents and experts in psychology and education, student's grouping and emphasizing the outcome and scores, instead of emphasizing the process and effort, are still seen in gifted schools, especially in gifted schools that scores play the most important role in the student's academic life and assessment. This situation causes students to foster a fixed mindset about intelligence and ability, compared to other students, and also after entering the gifted schools, if they experience failure, this kind of mindset will be further strengthened in them.

This is the story of many students who, after a few failures and with a fixed mindset of intelligence, display less active learning behaviors, and gradually move into underachievement. The encouragement of the growth mindset culture necessitates moving to group practices with no labels or negative messages for students, and using

teaching approaches that value thinking, hardworking and varied learning pathways for all students.

The findings of the present study prove that educators need to concentrate on special instruction about mindsets and the impact of this theory at the time of working with gifted students who are not well-motivated and possess a rather fixed mindset toward academic issues. Educators should not only consider academic scores, but should also attend to the way students understand learning and its impact on their achievement. Educators should emphasize a curriculum that includes a growth mindset model of instruction and focuses on perseverance, giving constructive feedback to improve, and increasing the malleability of intelligence.

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