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EXAMINING THE IMPACT OF TEACHER INTELLIGENCE BELIEFS ON STUDENTS' SELF-HANDICAPPING AND PERFORMANCE AT MATHEMATIC LESSON

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Summery

The theories teacher hold about their students qualities such as intelligence, have important consequences for their motivation and behavior. The purpose of this study was to assess the impact of teachers' self-theories about intelligence on student performance and use of self-handicapping strategies in mathematic problem solving. A filed empirical design was conducted. The subjects were 60 Iranian male students who were randomly assigned to one of the three, two experimental and a control, equal sized groups by giving them a particular set of instructions. Teacher intlligence beliefes was manipulated in the instructions and then subjects got 20 challenging mathematic problems to solve. Then, all subjects completed a self-handicapping questionnaire. MANOVA analyses of the resulting data showed incremental students reported fewer self-handicapping strategies for their problem solving performance and as well as more general performance compared with entity participants. Moreover, subjects, regardless of intelligence beliefs group, did not show significant difference between correct answers as a performance. The findings highlight that teachers' intelligence beliefs can affect the students' degree of effort and performance when fail probability is high relatively.

Key Words: *Intelligence beliefs; performance; self-handicapping; mathematics.*

1. Introduction

People's lay theories or beliefs provide a pivotal role in interpreting the world [1]. Dweck and her colleagues [2] propose that individuals' implicit theories about human attributes would structure the way they interpret and understand human behavior. These implicit theories have been useful in understanding achievement behavior and acted as a belief system, which gave meaning to it [3]. Dweck [3] defined implicit theories as one's perspective about his or her personal attributes (e.g., intelligence and personality) being a fixed uncontrollable trait (entity theory) that could not be changed through effort, or a malleable controllable quality that could be increased and improved through effort and investment (incremental theory). The two theories also lead to different beliefs about the value of effort.

Fixed intelligence (or entity belief) is a concept whereby intelligence is understood as a fixed trait. Those holding this conceptual definition of intelligence believe that people have a certain amount of intelligence, and nothing can be done to change that amount. When teachers believe that intelligence is fixed, then they often devalue the importance of students' effort, student who has intelligence does not need effort, and effort will not help student who lacks it [4]. To clarify, believing that effort is futile is already enough to put these students at a disadvantage. Even worse than that, they may believe that effort is not just useless but actively harmful. In the eyes of these entity teachers, the more effort their students put in, the more they demonstrate and confirm that they lack intelligence and no amount of effort can bridge the gap between smart and not smart.

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Thus, effort is not just futile but also dangerous—hard work is seen as a sign of low intelligence [5; 6]. In contrast, when teachers believe that intelligence is changeable, then effort can be useful. It can help them improve their students, regardless of their current level of intelligence. These teachers with an incremental theory are more likely to endorse statements such as "The harder you work at something, the better you will be at it." Believing in the power of effort helps children choose the path to greater success [7].

Dweck [8] represented the implicit theories as a meaning system, which had important consequences for motivation and behavior, particularly in achievement motivation contexts. On the basis of Dweck & Master [7] teacher with both theories, as long as they are succeeding readily, their different beliefs about intelligence may not always have much impact. However, once students begin to encounter or worry about setbacks, teachers' theories become increasingly important in determining how they will respond to their students. In particular, the two theories lead teachers to explain their students' setbacks in different ways, and how entity and incremental teachers explain their students failure, effect on how they choose a way to change.

Failing is usually a sign that students need to change their behavior and study strategies in the future. For teacher with an entity theory of intelligence, students' failure is a sign of low intelligence. By attributing failure to factors outside their control, these teachers do not help students change their behavior and they set themselves up to fail again and again. When it came to choosing a strategy for the future, students with an entity theory chose negative strategies that avoided effort [4]. These teachers lead students show a helpless behavior pattern [7]. Helpless learners did not attribute their successes to action taken, but rather explained them predominantly through uncontrollable causes such as luck or task difficulty. When helpless-pattern learners were encountered by failure, they reduced their aspiration, experienced negative emotions, demonstrated lower levels of persistence, and gave up the task easily [9; 10].

In contrast, for teachers with an incremental theory about intelligence, failure is an indication that that their students did not try hard enough. By attributing failure to their own lack of effort, they were poised to take control of the situation and set themselves up to do better in the future. When choosing strategies for the future, the incremental teachers chose positive strategies based on effort. These students are motivated to work even harder so that they would do better next time. This teachers lead students show a mastery oriented behavior pattern [11]. Mastery oriented learners want to acquire new competencies and to be able to have command of new situations. The information processing of mastery oriented learners is therefore focused on the surveillance of learning process and the search for new strategies that are useful in attaining learning goal. When this learning process is confronted by an obstacle, this is seen as an indication that the wrong strategy had been applied [12; 13].

Because performance relative to others is such a meaningful measure of intelligence within an entity theory, teachers with an entity theory may take steps to make their students performance less meaningful. Specifically, students may deliberately handicap their own performance, in order to blame their failure on something besides intelligence. Self-handicapping is the tendency to create obstacles to performing well [14]. Jones and Berglass [15] first described a phenomenon, labeled self-handicapping, in which people create obstacles that make failure more likely, but where presumably that failure is not diagnostic of their abilities. In the event of a failure, one can point to the self-handicap as the reason a better outcome was not obtained and thereby protect self-esteem and conceptions of intelligence [16; 17]. College students who believed that their intelligence was fixed were more likely to engage in self-handicapping behaviors such withholding effort from a task, feigning or claiming sickness, and procrastination [14]. Self-handicapping is more likely to occur when individuals are feeling uncertain about an important performance. According to the self-worth theory [18] withdrawing effort is a self-handicapping strategy that students may use to protect their sense of intelligence and worth in the event of a failure. On the other hand, the meaning of effort is different for student with incremental intelligence beliefs than for students with entity beliefs [7], but, they may not always have much impact [8].

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According to the self-worth theory of motivation, intelligence is closely tied to self-worth and so when there is doubt as to individuals' intelligence, there is doubt as to their self-worth [19]. A priority of some students, therefore, is to protect their sense of intelligence and to try to influence others' evaluations of their intelligence. Self-handicapping is a way students are able to do this. Self-handicapping strategies are self-protective and geared towards protecting individuals' competence in the event of failure [18]. Research has also demonstrated that self-handicapping is effective in protecting self-esteem and conceptions of intelligence in the face of failure. Specifically, the presence of a handicap allows individuals to shift attributions for a poor performance from intelligence to the handicap [17; 16]. In addition, self-handicapping maintains self-evaluations of intelligence in a specific domain, as well as global self-esteem, despite failure [16; 17]. The current study tested the impact of teachers' self-theories about intelligence on student performance and of self-handicapping strategies in mathematic problem solving. We expected that teachers' entity intelligence beliefs would induce higher level of self-handicapping strategies and reduce students' performance in problems, in contrast to incremental intelligence beliefs.

2. METHOD

2.1. Participants

This study was conducted using a field emprecial design. The initial participants comprised 90 tenth grade male Iranian students. Students who did not complete the entire questionnaire, however, were excluded from the analyses along with students who their rating of intelligence beliefs scale was not a match with their experimental group. As the control group size was 20 subjects other two experimental groups have been set same saized, hence, all analyses were based on a final sample of 60 students.

2.2. Measures

Intelligence beliefs. The Persian version of 'Intelligence Questionnaire, Version Two' [20] was employed to examine incremental and entity beliefs. Intelligence beliefs were assessed through six items responses were made on 5-point scales (*1 = strongly disagree to 5 = strongly agree*). According to Wang and Koh [21], these two dimensions of intelligence beliefs yielded satisfactory internal consistency (Cronbach's alpha coefficients were both .78).

Situational self-handicapping. Participants were presented with a list of 6 claimed self-handicapping strategies, all of which have arisen from previous research [22]. Using a seven-point Likert scale (*1 = strongly disagree to 7 = strongly agree*), participants were asked to rate the degree to which each claim would disrupt their performance with respect to the specific experimental task. Support for the reliability of this measure has been reported in past work (e.g. $\alpha = .85$) [23].

Mathematic test. An exam which enclouded 20 mathematic problems. All problems' difficulty cofficient was bettwen 0/40-0/60.

2.3. Procedure

The experiment took place during the participants' regular classes, which increases its ecological validity, in which they were told to get ready for matchematical exam. This exam took place after one week. All subjects were provided with a set of written text about an Iranian mathematician "Kharazmi" biography (about two pages). A research assistant who was unfamiliar with the theoretical purpose of the study randomly assigned the subjects to one of the three subjects groups by giving them a particular set of texts. The text sets were of the same length so that anyone looking at them casually would not suspect there were differences among them. The participants read their assigned set of texts an hour before the exam. Intelligence beliefs styles were manipulated in the biography texts. The entity beliefe was operationalized by using explicitly entity language such as: ''Kharazmin knew that innate intellegence is most important factor'', ''he was brilliant inborn'', ''nobody ever could be same as him''. In the incremental beliefs condition, wording such as ''Kharazmin knew that effort is most important factor'', ''he was brilliant because of his endeavor'' and ''anybody could be same as him just needs for effort'' were used instead. Then, to examine whether the entity beliefs manipulations produced the intended effect, we used the Intelligence beliefs scale [20]. Ultimately, the participants' vitality was assessed with

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a Situational self-handicapping Scale [22] after the exam. Participants were informed that there were no right or wrong answers and assured about the confidentiality of their answers. After the experiment, participants were thanked and debriefed on the purpose of the research.

3. Results:

The data collected were analyzed in two parts. Initially, descriptive statistics were computed. In addition, the technique of multivariate analysis of variance (MANOVA) was employed.

Table 1 presents the means and standard deviations for the two dependent variables, performance and self-handicapping, in the different experimental conditions.

Table 1. The performance and self-handicapping means and standard deviations of the four experimental conditions (N= 60)

	Entity beliefs Group (1)		Incremental beliefs Group (2)		Control Group (3)	
	M	SD	M	SD	M	SD
Performance						
-Sum of answers	*15.75*	*4/89*	*18/60*	*2.16*	*17.95*	*3.23*
-True answers	*3.85*	*2.27*	*4.40*	*2.11*	*5.35*	*2.03*
Self-handicapping	*4.65*	*0.81*	*2.95*	*1.39*	*3.15*	*0.67*

As Table 1 shows the worst performance and the highest use of self-handicapping sterategies were found in subjects with entity beliefs who have read a entity beliefs based biography of Kharazmi, and the lowest use of self-handicapping sterategies were found in subjects with incremental beliefs.

Performance and self-handicapping were investigated using the one-way multivariate analysis of variance (MANOVA) technique. MANOVA was conducted to determine the effect of group differences on the dependent variables (performance and self-handicapping). Table 2 shows the results of the analyses of variance. Significant differences were found for differences in dependent measures.

Table 2. The F values for Pillai's procedure

	value	F	hypoth. df	error df	sig of F
Intelligence beliefs	.474	5.792•	6	55.00	.000

•$P<.05$

The F values for Pillai's trace were statistically significant about intelligence beliefs, F (6, 55) = 5.792, $p < .05$. Subsequently, one-way analyses of variance (ANOVA) were performed for each of the dependent variables as follow-up tests to the MANOVA, as reported in Table 3.

Table 3. Univariate F-test

Dependent variable	SS	f	MS	F	sig of F
Performance					
Sum of answers	89.233	2	44.617	3.421*	.040
True answers	23.033	2	11.517	2.506	.091
Self-handicapping	34.533	2	17.267	16.954*	.000

•$P<.05$

Results of Table 3 show that teacher's inteliegence beliefs impact on changes in performance (sum of answers) and self-handicapping ($p < .05$). Subsequently, because the F values were statistically significant, follow-up contrast analyses with the Benferroni test were performed for each of the dependent variables, as reported in Tables 4 and 5.

Table 4. Follow-up contrast analyses with Benferroni test for Self-handicapping

	(I)	(J)	Mean	Std. Error	sig.

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Dependent Variable	group	group	Difference (I-J)		
Self-handicapping	1	2	1.7	.319	.000
		3	1.5	.319	.000
	2	1	-1.7	.319	.000
		3	-0.20	.319	1.00
	3	1	-1.5	.319	.000
		2	.20	.319	1.00

•*P*<.05

Results of Table 4 shows participants in group 1 reported significantly more Self-handicapping strategies compared with participants in other groups. No significant differences found between other groups in using of self-handicapping strategies. In other word, subjects with Entity beliefs showed the most using of self-handicapping strategies.

Table 5. Follow-up contrast analyses
with Benferroni test for performance (Sum of answers)

Dependent Variable	(I) group	(J) group	Mean Difference (I-J)	Std. Error	sig.
Sum of answers	1	2	-2.85	1.14	.047
		3	-.65	1.14	.177
	2	1	2.85	1.14	.047
		3	2.20	1.14	1.00
	3	1	.65	1.14	.177
		2	-2.20	1.14	1.00

•*P*<.05

Results of Table 5 shows participants in the group 1 (subjects with an entity beliefs) reported significantly lower sum of answers compared with participants in other groups. No significant differences found between other groupse.

Discussion

Dweck [11] posits that people's lay theories or beliefs about their intelligence have important consequences for motivation and behavior, particularly in achievement motivation contexts. The purpose of the current study was to examine the impact of teachers' intelligence beliefs on students' performance and self-handicapping strategies in mathematical exam. The results supported the hypotheses and demonstrated that students who believed that their abilities were global and enduring used more self-handicapping strategies These findings are consistent with Khalkhali [24], Kray and Haselhuhn [25], Chen et al, [26], and Good, Rattan, and Dweck [27]. On the other hand, students with an entity intelligence belief show more sum of answers but less true answers to problems in comparison to students with incremental beliefs about their intelligence and control group. Such a finding is important to those concerned with self-handicapping behaviors in classrooms. On the basis of Dweck and Master [7], as long as students with both theories are succeeding readily, their different beliefs about intelligence may not always have much impact, once they begin to encounter or worry about setbacks their theories become increasingly important in determining how they will respond to those setbacks. In particular, the two theories lead students to explain their setbacks in different ways.

In the current study, the exam in which the all groups participated, an exam included 20 mathematic problems with 0/40-0/60 difficulty cofficient, was a relative high level difficult task and could trigger intelligence beliefs to play their roles. For entity theorists having to try hard is a sign of low intelligence and confirms that they must not be very smart. Therefore, they are looking for a way to protect their self-worth despite their poor performance, and self-handicapping is one option. As was observed in this exam, students with entity intelligence beliefs showed more self-handicapping behaviors and less total answers in comparison with incremental theorists. These findings, however, did not appear for true answers. Entity theorists shown significally less sum of

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answers in comparison with other groups. For entity theorists, achievement situations carry important information about the self. Therefore, it looks they have more worried about their answers correctness then they have not put effort on solving the problem which were not easy. Although it increases the chances of failure, poor performance can then be blamed on the obstacles, rather than on innate intelligence. Intentional reduction of effort to get true answers is a self-handicapping strategy which may set students up for a sense of contingent self-worth.

5. Conclusion

The findings from the present study have important implications, despite the limitations. They suggest that students' intelligence beliefs could affect the use of self-handicapping strategies and in turn their performance at classrooms. When students are faced with a difficult task or test, their self theories about intelligence rise up and become increasingly important in determining how they will respond to situations and try to protect self-worth. Because setbacks and difficult tasks indicate high probability of failure, students with an entity theory about intelligence explain them as a sign that they are not able enough. For them, effort is futile, useless and harmful; the more effort they put in, the more they demonstrate and confirm that they lack intelligence. In the eyes of these entity students, the intelligence and effort relation is reversed; therefore, they may set up self-handicapping strategies for a sense of self-worth. In contrast, when students believe that intelligence is changeable, then effort can be useful. It can help them improve, regardless of their current level of intelligence. In summary, our argument so far is that for some individuals, achievement situations have deeper meaning about the self and that one cannot understand the dynamics of achievement motivation without taking this into account.

From a practical point of view, since entity students do not change their behavior, they set themselves up to fail again and again. They exhibit a maladaptive motivational pattern, negative cognitions, negative affect, reducing effort and aspiration, demonstrating lower levels of persistence and giving up the task easily [9; 10], choosing downward comparison [28]. Incremental beliefs about intelligence should be encouraged to reduce self-handicapping behaviors. Incremental form of self-theories may be developed by: providing the students with opportunities to experience self-esteem, self-determination and autonomy; providing increased opportunities for student input, guidance in the form of clear expectations and useful feedback; facilitating students' problem solving, helping them to work to their full potential and show their competence; identifying a link between their behavior and desired outcomes; emphasizing and acknowledging the students' concerns about failure and about close and challenging competitions so that the students feel understood and accepted. Therefore, physical education teachers can readily influence students' beliefs. By praising students for their effort and giving feedback about the process of learning, they can send the message that working hard and thoughtfully leads to greater success. They also send the message that hard work and progress are what they value, not natural, effortless, mistake-free brilliance that involves no learning.

The current study is not without its limitations. First, just a single measure of self-handicapping (self-handicapping scale) was used, it seems interview and behavioral observations could give useful information about strategies which students use in self-handicapping. Second, the cross-sectional nature of the research design only allowed for a slice-in-time study. Hence, future studies can look at both self-report and behavioral self-handicapping.

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