Original article

Mindset and its impact on academic performance and school-related happiness among upper primary school students

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Abstract

Objectives: The study aimed to determine students' mindsets and correlations between mindset and academic performance as well as school-related happiness among upper primary school students.

Methods: We conducted a cross-sectional analytic study of fourth, fifth and sixth grade students, to determine students' mindsets and school-related happiness using questionnaires. At the end of the semester, we collected percentage of the final examination score. The results were analyzed using descriptive statistical methods, multiple linear regression analysis and Pearson's correlation.

Results: Of 1,516 participants, 84.2% and 15.8% were classified into growth mindset and fixed mindset groups, respectively. Growth mindset was significantly associated with higher percentage of the final examination score and school-related happiness score ($p < .05$). Regarding multiple linear regression analysis, mindset score was significantly correlated with higher percentage on the examination score when controlling for Intellectual Quotient (IQ) and parental education ($\beta = .153$, $p < .01$). Furthermore, Pearson's correlation analysis revealed that mindset score was correlated with school-related happiness ($\beta = .499$, $p < .05$).

Conclusion: Growth mindset was the predominant mindset among upper primary school students and significantly related to higher percentage on the examination and school-related happiness scores.

Keywords: academic performance, happiness, growth mindset

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นิพนธ์ต้นฉบับ

ชุดความคิดและผลของชุดความคิดที่มีต่อผลสัมฤทธิ์ทางการเรียนและความสุขในการเรียนของนักเรียนชั้นประถมศึกษาตอนปลาย

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บทคัดย่อ

วัตถุประสงค์ : เพื่อศึกษาลักษณะชุดความคิดของนักเรียน และเปรียบเทียบความสัมพันธ์ของชุดความคิดกับร้อยละของคะแนนสอบปลายภาค และคะแนนความสุขในการเรียน

วิธีการ : ศึกษาแบบตัดขวางเชิงวิเคราะห์ในนักเรียนชั้นประถมศึกษาปีที่ 4 - 6 โดยเก็บข้อมูลชุดความคิด ความสุขในการเรียน และร้อยละของคะแนนสอบรวมทุกวิชาปลายภาคการศึกษา จากนั้นนำข้อมูลที่ได้มาวิเคราะห์ทางสถิติเชิงพรรณนา การถดถอยเชิงพหุคูณ และสหสัมพันธ์แบบเพียร์สัน

ผล : ผู้เข้าร่วมวิจัยทั้งหมด 1,516 คน จำแนกเป็นกลุ่มชุดความคิดเติบโตร้อยละ 84.2 และกลุ่มชุดความคิดฝังแน่นร้อยละ 15.8 จากการศึกษาพบว่ากลุ่มชุดความคิดเติบโตมีร้อยละของคะแนนสอบและคะแนนความสุขในการเรียนที่มากกว่าอย่างมีนัยสำคัญทางสถิติ ($p < .05$) จากการวิเคราะห์การถดถอยเชิงพหุคูณพบว่าคะแนนชุดความคิดมีความสัมพันธ์กับร้อยละของคะแนนสอบรวมที่มากกว่าเมื่อควบคุมระดับสติปัญญาและการศึกษาของผู้ปกครอง ($\beta = .153$, $p < .01$) จากสหสัมพันธแบบเพียร์สันพบว่าคะแนนชุดความคิดมีความสัมพันธ์กับคะแนนความสุขในการเรียน ($\beta = .499$, $p < .05$)

สรุป : นักเรียนระดับชั้นประถมศึกษาปีที่ 4 - 6 มีชุดความคิดเติบโตมากที่สุด และกลุ่มชุดความคิดแบบเติบโตมีความสัมพันธ์กับร้อยละของคะแนนสอบและความสุขในการเรียนที่มากกว่า

คำสำคัญ : ความสุข ชุดความคิด ผลสัมฤทธิ์ทางการเรียน

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Introduction

The mindset is a self-concept indicating an individual's beliefs concerning their intelligence and capability.[1] According to mindset theory, people hold either a fixed (entity) or growth (incremental) mindset.[2] Mindset is developed from the belief about their own intelligence. Based on learning and attribution theory, people create beliefs from their experiences, then these beliefs play a role in their motivation. People attempt to find explanations for what happens to them and these explanations then shape their emotions and reactions to the experience.[3] Individuals with growth mindset believe that their intelligence and talents are malleable and advance through learning as well as practicing with effort, endurance and guidance; they can increase their abilities. Therefore, they have a mastery goal leading them to perform to learn and increase their competence. They embrace and pursue challenging tasks, with effort as a path to mastery, learn from mistakes and feedback and are inspired by the success of others. On the other hand, individuals with fixed mindset believe that their intelligence and talents are innate remain unchanged. They have a performance goal leading them to act to appear smart. Therefore, they avoid and refrain from challenging tasks, see effort as useless, ignore feedback and feel threatened by the success of others.[2-4] As children try to make sense of their intelligence, what they experience reveals the meaning to them. Parents might transmit mindsets to their children though their reactions to their children's success or failure. After a success, praise for intelligence or outcome was more likely to induce a fixed mindset than praise for the effort or process involved.[3]

Academic achievement represents performance outcomes indicating the accomplishments of a student. Many factors affect academic achievement such as community characteristics, family factors and the child.[6] The child's factors influencing academic performance include cognitive (intelligence) and noncognitive factors.[7] Presently, people are more interested in noncognitive factors which comprise a set of attitudes, behaviors, and strategies such as self-efficacy, self-control, motivation and mindset.

Happiness or well-being is composed of several elements, including positive emotions, engagement, relationships, meaning and accomplishment; evaluating these elements as a whole provides an indicator of an individual's wellbeing.[8] Happiness depends upon many factors including genetic, health, social, socio-economic status and attitudes comprising thoughts, beliefs and expectations.[9-11]

Mindset may affect students' emotions, motivation, learning behaviors and academic outcomes. Studies have shown that students who have a growth mindset tend to obtain greater academic achievement and psychological wellbeing than those with a fixed mindset.[12-20] Furthermore, studies about mindset interventions found that developing a growth mindset among students leads to higher academic achievement and enjoyment in education.[12,21-25]

However, the meta-analytic review of Sisk, et al.[17] and Costa, et al.[16] found that mindsets were moderated by cultural background and most of the studies were conducted in middle school to college students. Thus, limited data is available

concerning mindset among primary school students in Thailand and how mindset would affect their academic achievement and school-related happiness. This study aimed to determine children's mindsets, and associations and correlations between mindset and academic achievement and school-related happiness among upper primary school students.

Methods

Study design and population

We conducted a cross-sectional analytic study of fourth, fifth and sixth grade students from June 1 to September 30, 2018. The participants were selected using purposive sampling from nine schools located in Bangkok, Nonthaburi, Prachinburi, Ratchaburi, Kanchanaburi and Nakhon Ratchasima province for generalizability. The exclusion criteria included children with known case of Autism Spectrum Disorder (ASD) or intellectual disability (IQ <70). Before obtaining consents and distributing the questionnaires, parents and participants were informed about the objectives of this research, and assured that all data would be kept confidential, accessible only to the researchers and to be only used for research purposes. At one month after the beginning of the semester, we collected demographic data, measured intelligence quotient (IQ) using the Standard Progressive Matrics (SPM) raw score and converted to IQ score, and determined mindset and school-related happiness levels using questionnaires. At the end of the semester, we measured academic performance of each participant using the percentage of the final examination score among all subjects. We measured the mindset in the beginning of the trimester to see how the mindset would affect academic performance in the end of the trimester. The study was approved by the Institutional Review Board of the Royal Thai Army Medical Department.

The mindset questionnaire was developed from the mindset assessment profile which was permitted from Mindsetworks.[26] It comprised eight questions consisting of statements regarding intelligence theory, learning goals, effort beliefs and response to failure.[2,12] Participants completed questionnaires by rating the level of agreement from 1 to 6. Scores 8 to 28 and 29 to 48 were categorized to represent fixed mindset and growth mindset respectively. Content validity of questionnaire which was translated into Thai exhibited Index of Item-Objective Congruence (IOC) was 0.8 to 1.0. The internal reliability was tested among 30 participants revealed Cronbach's alpha coefficient was 0.65.

The school-related happiness questionnaire was developed in a short form questionnaire with ten statements concerning self-esteem, affect and depression. Participants were asked to decide how much they agreed or disagreed with a statement, rating from 1 (disagree a lot) to 4 (agree a lot). Higher scores indicated higher school-related happiness level. Content validity of the questionnaire was tested by two developmental behavioral pediatricians and one child psychiatrist. The Index of Item-Objective Congruence (IOC) was 0.6 to 1.0. Therefore, we revised some of the items in the questionnaire according to experts' advice. The questionnaire's internal reliability was tested

among 30 children, and the Cronbach's alpha coefficient was 0.7.

Statistical analysis

Statistical analysis was performed using IBM SPSS Statics for Windows, Version 23 (Armonk, NY: IBM Corp.) Demographic and mindset data were presented in the descriptive statistics. We assessed associations between mindset and academic achievement and school-related happiness using Independent sample t-test. Multiple linear regression analysis and Pearson's correlation coefficient were used to determine the correlations between mindset and academic achievement and school-related happiness.

Results

A total of 1,516 students participated in the study; 47.6% were male, 26.4% were in fourth grade, 36.6% in fifth grade, and 36.8% in sixth grade, with the average IQ score of 112.52 ± 15.5. Parents of most participants had educational levels below a bachelor's degree. (Table 1) A significant difference between paternal and maternal education was found between both mindset groups ($p < .05$) (Table 2)

According to their mindset score; 239 students (15.8%) had fixed mindset, and 1,277 students (84.2%) had growth mindsets. Prevalence of growth mindset among fourth, fifth, and sixth grade students were 87.0%, 86.2% and 80.3%, respectively. Interestingly, sixth grade students significantly had a lower growth mindset than fourth and fifth grade students ($p < .05$). (Fig. 1).

We found associations between types of mindsets and academic performance and school-related happiness. A significantly higher percentage of the final examination score was found in the growth mindset group than the fixed mindset group (77.55 ± 9.12 vs. 74.85 ± 8.67, $p < .001$). A significantly higher school-related happiness score was found in the growth mindset group than the fixed mindset group (20.83 ± 4.10 vs. 15.89 ± 4.45, $p < .001$).

The mindset score was correlated with the final examination score ($\beta = .153$, $p < .001$). When paternal and maternal education and IQ score were controlled, a one point increment of mindset score predicted an increasing percentage of final examination score by 0.29 point (B = 0.29, SE = 0.04) (Table 3).

According to Pearson's correlation analysis, mindset score was positively correlated with school-related happiness ($r = 0.499$, $p < .05$) (Table 4).

Table 1 Demographic data

Data	n (%)
Sex	
Male	722 (47.6)
Female	794 (52.3)
IQ (mean ± SD)	112.52 ± 15.5

Table 1 Demographic data (continued)

Data	n (%)
Grade	
4th	401 (26.4)
5th	556 (36.6)
6th	559 (36.8)
Paternal education	
Below bachelor's degree	1131 (74.6)
Bachelor's degree or above	385 (25.4)
Maternal education	
Below bachelor's degree	1040 (68.6)
Bachelor's degree or above	476 (31.4)

Table 2 Association between mindset and demographic data

Variables	Fixed Mindset (n = 239)		Growth Mindset (n = 1277)		Total		X^2	p-value
	n	%	n	%	n	%		
Sex							2.06	.151
Male	124	8.1	598	39.4	722	47.6		
Female	115	7.5	679	44.7	794	52.3		
IQ	M = 111.57, SD = 16.43		M = 112.69, SD = 15.37		M = 112.52, SD = 15.54		t = -1.21	.305
Grade							10.35	.006*
4th	52	3.4	349	23.0	401	26.4		
5th	77	5.0	479	31.6	556	36.6		
6th	110	7.2	449	29.6	559	36.8		
Paternal education							3.97	.046*
Below bachelor's degree	166	10.9	965	63.6	1131	74.6		
Bachelor's degree or above	73	4.8	312	20.5	385	25.4		
Maternal education							4.49	.034*
Below bachelor's degree	150	9.8	890	58.7	1040	68.6		
Bachelor's degree or above	89	5.8	387	25.5	476	31.4		

* statistically significant at $p < .05$

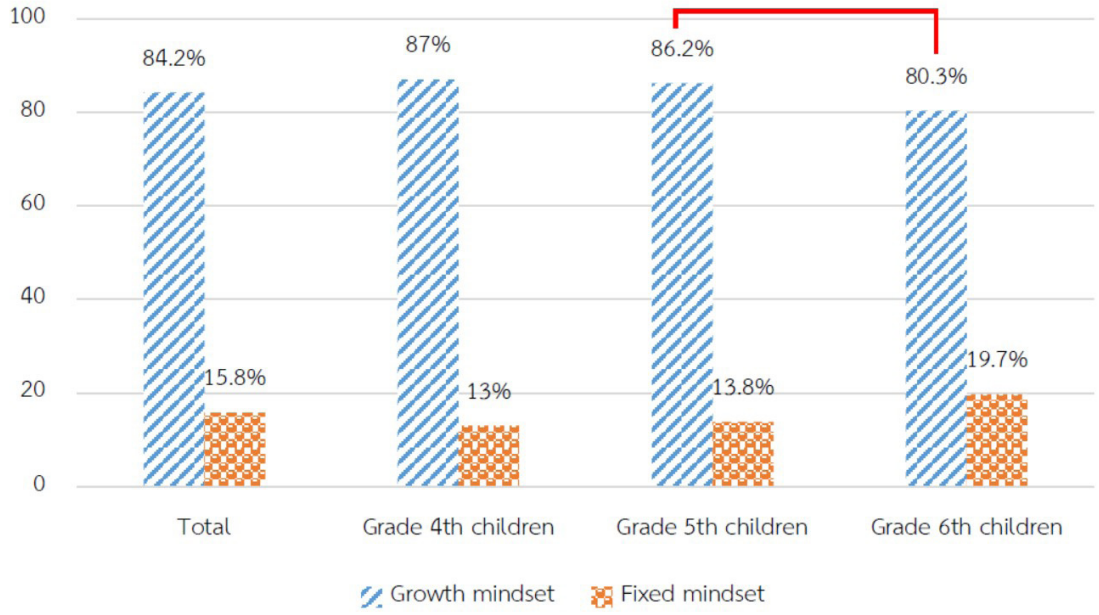

Figure 1 Percentage of mindset among fourth to sixth grade students

Table 3 Relation between mindset score with academic achievement using multiple linear regression analysis

Independent variable	B	SE(B)	β	t	p
Dependent variable: GPA					
Constant	45.25	1.99		22.70	< .001*
Paternal education: Bachelor's degree or above	1.97	0.53	0.098	3.74	< .001*
Maternal education: Bachelor's degree or above	2.40	0.50	0.128	4.83	< .001*
Intelligence quotient	0.19	0.01	0.335	14.31	< .001*
Mindset	0.29	0.04	0.153	6.62	< .001*
Analysis of Variance (ANOVA)					
$F(4, 1511) = 93.07, p < .001$*					
Model fit					
$R = 0.445$, $R^2 = 0.198$, $R^2_{adjust} = 0.196$, SE = 7.81					

* statistically significant at $p < .05$

Table 4 Correlation between growth mindset and school happiness using Pearson's correlation analysis

Variables	Mindset	Happiness
Mindset	1	
Happiness	0.499*	1
M	33.01	30.1
SD	4.66	4.55

* statistically significant at $p < .05$

Discussion

This study found that 84.2% of students have growth mindset while 15.8% held fixed mindset. The sixth grade students held lower percentage of growth mindset than the fourth and fifth grade students. The prevalence of each mindset differed from the general population in related studies which reported that prevalence of growth and fixed mindsets were equally 40% and the rest 20% were undecided.[2] However, most related mindset research was conducted among middle school to college students or adult subjects. Therefore, young children in primary school might hold growth mindsets more than fixed mindsets. A substantial body of research on age differences in intelligence conceptions concluded that older children were more likely than younger children to view intelligence as stable over time.[27] Concerning young children, perceived levels of their intrinsic motivation and competence were very high and exaggerated at the beginning of education.[28] According to the constructivist perspective, children's perceptions are the result of development and construction over time through learning experiences.[29] This may be explained by several reasons. Young children tend to equate effort with ability, having tried hard or mastered a task could lead them to feel smart and positive evaluate their abilities.[30] Feedback in a positive way from teachers or parents could cultivate growth mindset.[31-33] Some studies have reported that children's initial optimism rapidly and systematically declines along elementary school years.[34-36] Studies have reported that learning goals decrease with age starting in late elementary school and beyond.[37,38] Among older children, academic performance is emphasized more in school and home environment. They face more stress or critical experience related to education such as some feedback or learning environment. Thus, they may focus more on the outcome and avoiding failure which are the performance goals that might cultivate fixed mindsets.[31-33,38] However, some studies found that older children were more likely than younger children to view intelligence as an internally controllable ability or among older versus younger students, theories of intelligence were more incremental, whereas learning goals were lower.[32,39] Secondly, culture may affect people's mindset differently. The meta-analytic review by Costa et al. considered that more collectivist societies, which is the type of society in Thailand, emphasize on learning process which may cultivate growth mindsets rather individual results.[16]

This study showed that students with growth mindset were correlated with higher academic achievement when measured by the percentage of examination score at modest level after controlling for confounding factors such as parent's education and intelligence quotient. This finding was similar to the meta-analytic review by Costa A, et al.,[16] which reviewed 46 studies among middle school to college students and found a positive direct association between students' implicit theories of intelligence (or growth mindset) and their academic performance at a modest level and highlighted those implicit theories of intelligence can be particular importance in challenging academic situations. In our study in Thailand, most of the parents' education levels were below a bachelor's

degree, which may be classified in low socio-economic status, and may represent a challenging academic situation for a child. As a result, students with the growth mindset would believe in their malleable abilities, having learning goals, using effort as the key to success, believing in the meaning of setback in that they need to work harder or alter their strategies, and sustaining their academic improvement through self-reinforcing cycles of motivation and learning-oriented behaviors. These variables explain why students with growth mindset were more resilient and acquire higher academic achievement than students with fixed mindset when they confronted a challenging academic situation.[40]

This study also found that growth mindset was correlated with higher school-related happiness scores at a moderate level. This finding was consistent with related studies reporting that growth mindset was positively correlated with positive emotion or well-being.[18-20] A study by King RB showed that the entity theory of intelligence (fixed mindset) was negatively associated with life satisfaction and positively associated with adverse effects while the implicit theories (growth mindset) and specific dimensions of subjective well-being were reciprocally related.[41] Thus, children with a growth mindset may experience more happiness in school or, on the other hand, when they are happy at school they will probably develop the growth mindset. Zeng, et al. reported that high level of growth mindset among students predicts higher psychological well-being by enhancing resilience.[18] However, studies on mindset type and happiness levels remain limited.

Our research's strength was related to the large study sample comprising children younger than those in other related studies. However, this study encountered some limitations. Due to employed a cross-sectional design in our study, so we could not conclude that growth mindset contributes to academic achievement and school-related happiness or vice versa.

Conclusion

Among upper primary school students, growth mindsets predominated. Growth mindset was correlated with higher academic achievement and school-related happiness levels. Further growth mindset studies using longitudinal designs or growth mindset interventions are needed.

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ความรู้เดิม : ยังไม่มีการศึกษาชุดความคิด (mindset) ในเด็กนักเรียนของประเทศไทย
ความรู้ใหม่ : เด็กนักเรียนส่วนใหญ่มีชุดความคิดแบบเติบโต ซึ่งชุดความคิดแบบเติบโตนี้มีความสัมพันธ์กับผลคะแนนสอบและความสุขในการเรียนที่มากกว่า
ประโยชน์ที่นำไปใช้ : จัดการเรียนการสอนที่ส่งเสริมให้เด็กนักเรียนมีชุดความคิดแบบเติบโต

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Supplements

แบบประเมินกรอบความคิด

คำชี้แจง ให้วงกลมรอบตัวเลขในข้อที่หนูเห็นด้วยมากที่สุด

ท่านเห็นด้วยหรือไม่เห็นด้วยกับข้อความเหล่านี้	ไม่เห็นด้วย			เห็นด้วย			คะแนน
	ไม่เห็นด้วยอย่างมาก	ไม่เห็นด้วย	ไม่เห็นด้วยเล็กน้อย	เห็นด้วยเล็กน้อย	เห็นด้วย	เห็นด้วยอย่างมาก	
1. หนูสามารถฉลาดขึ้นได้ ไม่ว่าหนูจะมีความฉลาดแค่ไหน	1	2	3	4	5	6	
2. หนูเรียนรู้สิ่งใหม่ ๆ ได้ แต่จริง ๆ แล้ว หนูฉลาดขึ้นไม่ได้	1	2	3	4	5	6	
3. หนูชอบงานที่ได้ใช้ความคิด	1	2	3	4	5	6	
4. หนูชอบงานที่หนูสามารถทำได้ดีโดยไม่ยากเกินไป	1	2	3	4	5	6	
5. หนูชอบงานที่ทำให้หนูได้เรียนรู้ ถึงแม้ว่าหนูจะทำผิดพลาดก็ตาม	1	2	3	4	5	6	
6. หนูชอบงานที่หนูทำได้อย่างดีที่สุดโดยไม่มีข้อผิดพลาด	1	2	3	4	5	6	
7. งานที่ยาก ทำให้หนูพยายามมากขึ้นและไม่ท้อถอย	1	2	3	4	5	6	
8. เมื่อหนูทำงานหนัก ทำให้หนูรู้สึกว่าหนูไม่ฉลาด	1	2	3	4	5	6	

แบบประเมินความสุขในการเรียน

คำชี้แจง โปรดอ่านข้อความ และเลือกคำตอบโดยทำเครื่องหมาย ✓ ลงในช่องขวามือที่ตรงกับระดับความเห็นของหนูมากที่สุด เพียงช่องเดียว โดยมีเกณฑ์ดังนี้

ข้อความ ในช่วง 2 สัปดาห์ที่ผ่านมา	ไม่เห็นด้วยอย่างมาก	ไม่เห็นด้วย	เห็นด้วย	เห็นด้วยอย่างมาก
1. ฉันกระปรี้กระเปร่าเวลาเรียน				
2. ฉันรู้สึกกังวลกับการเรียน				
3. ฉันอยากไปโรงเรียนเพื่อเรียนหนังสือ				
4. ฉันรู้สึกผ่อนคลายเวลาเรียน				
5. ฉันมีสมาธิในการเรียน				
6. ฉันรู้สึกหงุดหงิดเวลาเรียน				
7. ฉันรู้สึกอยากร้องไห้เวลาเรียน				
8. ฉันเหนื่อยเวลาเรียน				
9. ฉันรู้สึกดีเวลาเรียน				
10. ฉันอยากเลิกเรียนหนังสือ				