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A causal model of learning achievement of upper primary students with learning engagement as a mediator variable

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Abstract

The research aimed to: (1) study the Learning Engagement level of upper primary students; and (2) develop and examine the causal model of Learning Achievement of 692 upper primary students with Learning Engagement as a mediator variable. The multi-stage random sampling was used to select the samples. The data collection involved questionnaires and tests. The content validity based on the IOC Index points were .80–1.00, and for the reliability, the Cronbach's alpha coefficient was .501–.898, which is in an acceptable range. The level of difficulty and discrimination power was in acceptable range (p = .223–.795 and r = .125–.617). The data were analyzed using basic statistics and Structural Equation Model (SEM) operated with LISREL8.80 program. It was found that (1) upper primary students' level of Learning Engagement was at medium to high (M = 3.656, SD = 0.190). (2) The causal model of Learning Achievement of upper primary students with Learning Engagement as a mediator variable was consistent with empirical data considered based on the Chi-square test values (χ^2 = 20.582, df = 15, p = .151, GFI = .994, AGFI = .978, RMR = .014, RMSEA = .023).

Introduction

Learning Engagement is one of the characteristics of an individual which is important and necessary to develop thinking processes, skills, and behaviour that lead to a learner's academic success (Fredricks, Blumenfeld, & Paris, 2004; Halliday, Calkins, & Leerkes, 2018; Wang & Holcombe, 2010). There are many factors affecting learning engagement. Such factors depend on the contexts and target. This research looked into learning engagement in a group of students in the upper primary level. Teaching techniques and methods are necessary for creating students' learning engagement (Khammanee, 2002). Such vital role of learning engagement will reinforce the students to become successful learners both directly and indirectly. From the previous studies which the researcher synthesized, the causal factors were categorized into 2 groups. The first is personal characteristics which are learners' intrinsic characteristics (Guo, 2018; Halliday et al., 2018; Lowrie, 2007) and learning motivation

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(Barkley, 2009). Among the factors in this group, motivation, as part of personal characteristics, affects learning engagement of learners in a rather high degree (Barkley, 2009; Guo, 2018). This is because motivation is the internal force inside the learners that pushes them to express their behavior willingly and ambitiously. The second group is external factors regarding environment and pedagogy (Gütl et al., 2015; Vongvithayasakul, 2008). Teachers' pedagogy has an impact on learners' learning engagement and learning achievement. The findings conform to the key theories of this research which are Social Learning Theory (Bandura, 1999) and Motivation Theories (Deci & Ryan, 1980 as cited in Kowatrakul, 2013) which believe that human behavior is subject to the relationship between intrinsic factors and surrounding factors which are extrinsic. These two are the cause of behavioral changes and they create learning engagement for learners. The extrinsic factors concern environmental contexts. If a teacher sets suitable learning atmosphere and uses a variety of teaching media and materials to support his/her teaching, learners will be more eager to learn (Abolmaali, Rashedi, & Ajilchi, 2014; Nelson, Spence-Thomas, & Taylor, 2015). That is to say, learning engagement is the key variable of which influence leads to learners' academic achievement both directly and indirectly.

The past studies mentioned earlier point out the significance of learning engagement as a mediator variable, which has been more important to instruction. Many aspects are needed together in order to reach achievement. According to Barkley (2009), learning will never take place if there is no engagement in learning. Learning engagement is a process and outcome resulting from active learning instruction interacting with motivation continuously and for a long time. Therefore, to succeed in learning, learning engagement is one of the significant variables that pushes a learner to have suitable behavior for learning as well as motivation. The Social Learning Theory, Motivation Theories, and Constructionism help explain the role and duties of learners including their performance. These theories, therefore, are of great importance to learners' learning. The concepts regarding motivation and active learning mentioned above together with the research findings show the significance of learning engagement as a mediator variable transferring both factors to learning achievement (Barkley, 2019; Gütl et al., 2015; Lee, 2014). Studying both causal variables at the same time under the same causal model may give the result which reveals the influence size of the variables in each group.

Therefore, this research tested the causal relationship between related variables and learning engagement of students in the upper primary level in Saraburi Primary Educational Service Area Office 1. The research was led by the students' average scores on the Ordinary National Education Test (O-NET) which, in every subject, were lower than the national average and lower than 50 percent. Moreover, their average score on the OECD Program for International Student Assessment (PISA) 2018 was 44 percent lower than the standard score (National Institute of Educational Testing Service, 2019). These test results demonstrated the necessity of promoting learning engagement and higher learning achievement in learner development. This research aimed to: (1) study the Learning Engagement level of upper primary students; and (2) develop and examine the causal model of Learning Achievement of upper primary students with Learning Engagement as a mediator variable—in order to yield the most benefits to further educational development for children in all levels equally and to bring about more extensive knowledge of Learning Engagement of upper primary students.

Literature Review

Learning Engagement means the manifestation of behaviour regarding participation in learning or doing activities which enables a person to gain knowledge. It echoes a person's behaviour and actions that the connection between the person and learning creates engagement and desire for success (Barkley, 2009; Guo, 2018; Halliday, Calkins, & Leerkes, 2018; Yoon, Kim, & Kang, 2018). Finn and Zimmer (2012), and Fredricks, Blumenfeld, & Paris (2004) described the components of engagement in the same way that engagement consists of 3 components, which are Cognitive Engagement, Emotional Engagement, and Behavioral Engagement. Educators have proposed a variety of approaches to developing learning engagement such as reinforcement strategies; enhanced learning models which highlight small group instruction; and teacher involvement, whereby a teacher takes care of learners in every aspect especially teaching and learning which emphasizes learners' interaction with others to create an atmosphere that is suitable for learning. Based on the concept of Constructivism, active learning is suitable for learning in the 21st century in which learners should be able to apply the knowledge learned to their daily living. Learners should be promoted with critical thinking skills, collaboration, and problem-solving skills, and they should take part in teaching and learning activities

(Sweller, 2006). Therefore, active learning is learning management, which gives opportunities for learners to express their thoughts and interact with other people. Active learning instruction emphasizes the learning process rather than focusing on the content to enable learners to learn by themselves, practice thinking skills, and perform the tasks regarding the lessons (Bonwell & Eison, 1991).

Previous international studies show that learning engagement has been researched for a long time. It is a variable, the concept of which has been changed continuously (Dormann, Demerouti, & Bakker, 2018; Finn & Zimmer, 2012; Fredricks et al., 2011; Halliday et al., 2018). As a mediator variable studied (Dormann et al., 2018; Yoon et al., 2018), learning engagement mediated factors such as self-control and self-efficacy to analytical thinking (Dormann et al., 2018) and learner effort and teacher support to learning achievement (Yoon et al., 2018) leading to learner success. When looking into the studies on causal factors influencing learning engagement, it is found that motivation, the factor regarding personal characteristics, influences learning engagement of learners in a rather high degree (Barkley, 2009; Guo, 2018). For the extrinsic factors, it is found that teachers' instructional management influences learners' learning engagement and learning achievement (Vongvithayasakul, 2014). The findings point out that motivation is a stimulus for generating a person's interest and enthusiasm for learning and doing activities. These qualities make learners engaged in learning. The extrinsic factors are related to teachers' instructional management process, for instance, a teacher using different and interesting teaching methods and employing active learning by giving learners freedom to think and do activities and good relationship between learners and a teacher and between learners and their classmates (Abolmaali et al., 2014; Nelson et al., 2015). The factors mentioned greatly motivate learners to learn and therefore create learning engagement—all of which finally have positive effects on learning acehivement. The ideas are presented in the following conceptual framework (figure 1):

Methodology

Population and Sample

The samples were students in Grade 4–6 who were studying in the schools under the jurisdiction of the Office of the Basic Education Commission, Saraburi Primary Educational Service Area Office 1. The researcher employed simple random sampling and specified the sample size according to Hair, Black, Babin, and Anderson (2010) who proposed that to analyze a linear structural equation model, the sample size should be 10–20 times of the parameters which appears in the model. Therefore, the researcher, specified the size of 692 samples. The proportion of data collection was evenly divided with simple random sampling.

Data Collection and Data Analysis

The researcher collected the data by herself from upper primary students. The data collection tools were questionnaires and the science test. The content validity was measured by five experts in different areas including research tool development, research methodology, and educational psychology variables. It was found that the IOC Index was .800–1.000. The reliability was assessed by calculating Cronbach's alpha coefficients.

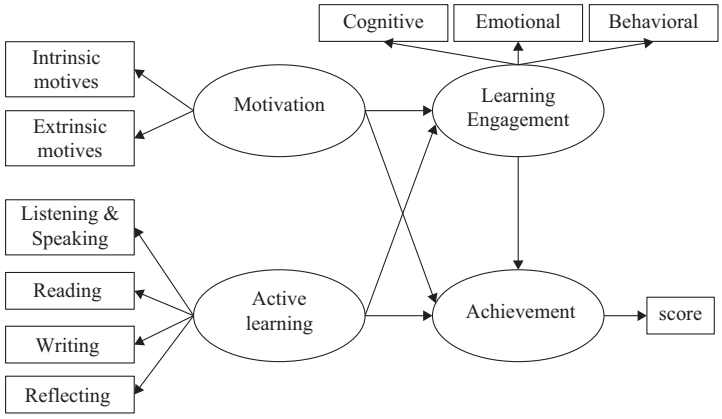


Figure 1 Conceptual framework

The questionnaire was found with the reliability of .501–.898, which is acceptable, and the questionnaire could be used in the actual context. The questionnaire used in this research was in the form of a five-point rating consisting of 4 parts which were: (1) Respondents' personal information including gender, educational level, and favorite subjects; (2) The Motivation Scale by which the researcher studied the components of assessing students' motivation following the concept proposed by Harter (1980) and Vallerand et al. (1992), and the concept was used as a conceptual framework for designing 10 questions. Cronbach's alpha for the total score was .607.; (3) Active Learning Questionnaire by which the researcher used the concepts and components from the analysis of characteristics of Active Learning integrated with the concepts of the educators (Bonwell & Eison, 1991) to design 20 questions. Cronbach's alpha for the total score was .924; and (4) Learning Engagement Questionnaire in which the researcher developed an assessment tool based on the concepts proposed by Fredricks et al. (2011), and Finn and Zimmer (2012). This part consisted of 15 questions. Cronbach's alpha for the total score was .886. For assessment of Learning Achievement, the researcher employed the science multiple choice question test consisting of 20 questions. The level of difficulty and discrimination power was in acceptable range (p = .223–.795 and r = .125–.617) with the reliability of .712.

The data were analyzed following the research objectives: (1) To study the level of Learning Engagement using descriptive statistics, which are mean and standard deviation; and (2) To develop and examine the causal model of Learning Achievement with Learning Engagement as a mediator variable. The researcher employed the Structural Equation Model (SEM) operated with LISREL program.

Results

1. Learning Engagement was analysed based on the 3 components which were Cognitive Engagement, Emotional Engagement, and Behavioural Engagement. The analysis showed that upper primary students' Learning Engagement was at a medium to high level (M = 3.656, SD = 0.019).

2. Based on the analysis of the causal model of Learning Achievement of upper primary students with Learning Engagement as a mediator variable, it was found that the model conformed to the empirical data considering a chi-square statistic (χ^2 = 20.582), degrees of freedom (df = 15), probability (p = .151), Goodness of Fit Index (GFI = .994), Adjusted Goodness of Fit Index (AGFI = .978), which is close to 1, Root Mean Square Residual (RMR = .014), Root Mean Square Error of Approximation (RMSEA = .023), which is close to 0, and chi-square/degrees of freedom ratio (χ^2/df = 1.372), which is lower than 2. Based on the statistical data, it can be concluded that the model conformed to the empirical data. The details are described in Table 1.

Path Analysis of Variables in the Causal Model

It was found that the causal model of Learning Achievement of upper primary students with Learning Engagement as a mediator variable conformed to the empirical data (Chi-square = 20.582, df = 15, p = .151, GFI = .994, AGFI = .978, RMR = .014, RMSEA = .023). When considering validity of 10 observed variables, the validity was .351–.994. The variable with the highest validity was Science Test score (Scr). The next was Intrinsic Motivation (Int) with the validity of .857. The variable with the lowest validity of .351 was Cognitive Engagement (Cog).

Table 1 Factor loading and percentage of covariation of variables in the Causal Model

Variable			b	*SE*	*t*	B	R^2
observed exogenous variable	MO	Int	1.000	-	-	0.931	0.867
		Ext	0.853	0.070	12.228	0.812	0.660
	AL	Lis	1.000	-	-	0.921	0.848
		Rea	1.017	0.054	18.878	0.821	0.674
		Wri	0.924	0.069	13.439	0.741	0.549
		Ref	0.980	0.060	16.233	0.856	0.733
observed endogenous variable	LE	Cog	1.000	-	-	-	0.351
		Emo	1.059	0.096	11.030	0.619	0.384
		Beh	1.335	0.110	12.129	0.785	0.616
	ACH	Scr	1.000	-	-	0.982	0.964

Note: Chi-square = 20.582, df = 15, p = 0.151; GFI = 0.994, AGFI = 0.978, RMR = 0.014, RMSEA = 0.023.

The coefficients of determination (R^2) of latent variable modeling including Learning Engagement (LE) and Learning Achievement (ACH)were .445 and .150 respectively. This means Motivation (MO) and Active Learning (AL) can explain the variation of Learning Engagement (LE) and Learning Achievement (ACH), which were 44.5 percent and 15.00 percent respectively. The direct effect and indirect effect between variables are presented in the following order:

Learning achievement

When considering the direct effect and indirect effect on Learning Achievement (ACH), it was found that Motivation (MO), Active Learning (AL), and Learning Engagement (LE) had a direct effect on Learning Achievement. Motivation (MO) and Learning Engagement (LE) had a positive effect on Learning Achievement with a significance level of .05 and the effect sizes of .219 and .763 respectively. Active Learning had a positive effect on Learning Achievement (ACH) with no statistical significance and the effect size was .029. Moreover, Motivation (MO) and Active Learning (AL) had an indirect effect on Learning Achievement (ACH), and in this case, Learning Engagement (LE) served as a mediator variable mediating the relationship between Motivation (MO) and Learning Achievement (ACH) with no statistical significance and with a positive effect of .057 while Learning Engagement (LE) served as a partial mediation variable mediating the relationship between Active Learning (AL) and Learning Achievement (ACH) at a significance level of .05 and with a positive effect of .303.

When comparing direct effect and indirect effect on Learning Achievement (ACH), Learning Engagement (LE) had the highest direct effect on Learning Achievement (ACH) (.755) while Motivation (MO) was found with higher direct effect (.219) than indirect effect (.057). For Active Learning (AL), there was higher indirect effect (.303) than direct effect (.029) mediated by Learning Engagement (LE).

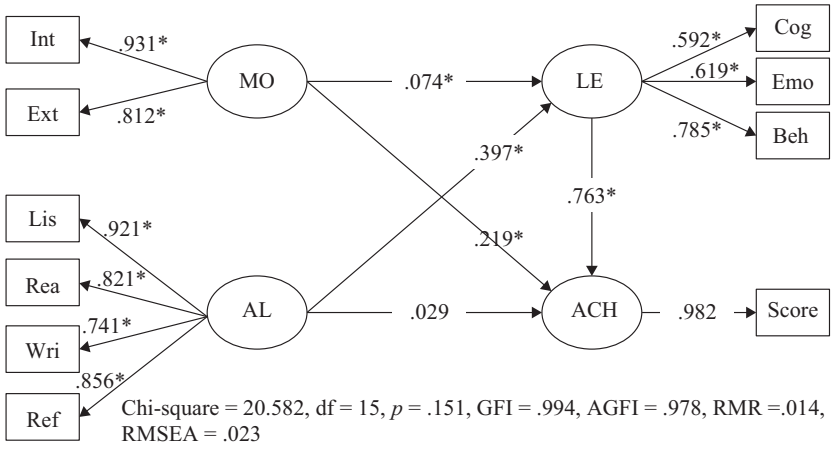
Learning engagement

When testing for mediation affecting Learning Engagement (LE) variable, Motivation (MO) and Active Learning (AL) were found with direct effect on Learning Engagement (LE) with a significance level of .05 and with positive effects of .074 and .397 respectively, which means when the students have Motivation and are given Active Learning instruction, their Learning Engagement (LE) increases as described in Table 2.

Table 2 Influence coefficient of learning achievement of upper primary students with learning engagement as a mediator variable

Independent Variable	MO			AL			LE		
Dependent Variable	DE	IE	Total	DE	IE	Total	DE	IE	Total
LE	.074*	-	.074*	.397*	-	.397*	-	-	-
ACH	.219*	.057	.276*	.029	.303*	.331*	.763*	-	.763*

Note: MO = Motivation; AL = Active Learning; LE = Learning Engagement; ACH = Achievement.
*$p < .05$.



Figures 2 Causal model of learning achievement of upper primary students with learning engagement as a mediator variable

Conclusion and Discussion

Effect of Motivation on Learning Engagement and Learning Achievement

The relationship between the causal model and overall empirical data conforms to the conceptual framework. When considering the effect of Motivation on Learning Achievement, it was found that Motivation has a direct effect on Learning Engagement and Learning Achievement at a fairly low level, which means that Motivation is one of the key factors that encourages students to exhibit behaviour that leads to academic success. If the students enjoy, are interested in, and are enthusiastic about doing learning activities, they will control their own behaviour by putting more effort and interest in their learning. Such behaviour will lead the students to academic success, which is a higher degree of Learning Achievement (Tiramongkoljit, 2016; Walker, Greene & Mansell, 2006; Yoon et al., 2018). The notion conforms to the theories of motivation (Kowatrakul, 2013) which stated that behaviours as a result of motivation will give learners determination, enthusiasm, and effort to complete the particular activities. This notion also conforms to the study conducted by Tiramongkoljit (2016) who found that motivational enhancement by organizing learning activities based on gamification concept for primary learners has an effect on the degree of motivation and science learning achievement at a significance level of .05. However, the direct effect of Motivation on Learning Achievement is fairly low. This may be caused by some other external factors such as a surrounding context and different child development stages of learners who are in the upper primary level. That is to say, they are transferring from Middle Childhood to Adolescence (Abolmaali et al., 2014; Nelson et al., 2015). Therefore, they enjoy new and challenging tasks and need to be accepted, following Erikson's Psychosocial Theory (Upaphai, 2015). Therefore, motivational enhancement alone may not be enough to make learners become enthusiastic and perceive the value of learning in the long run. Other related factors should also be encouraged to create a change in learning achievement in a positive way. Moreover, they should be determined and perceive values and goals of learning. Such behaviours will create engagement and desire to reach success and to finally reach a higher degree of learning achievement.

Effect of Active Learning on Learning Engagement and Learning Achievement

The effect of Active Learning on Learning Engagement and Learning Achievement based on the Table suggests that Active Learning has a direct effect on Learning Engagement with a statistical significance. The results of this research are in the same direction as those of Barkley (2009), who found that the key factors affecting Learning Engagement occur as a result of Motivation and Active Learning. It can be added that there will be no effective learning if a learner lacks Learning Engagement. Learning Engagement is not only the perception of the content of a lesson, but it includes emotions, feelings, and participation in learning—all of which bring about positive results in learning. The results conform to that of the research by Lowrie (2007), which found that teaching methods influence Learning Engagement and Learning Achievement. The studies also conform to that of Vongvithayasakul (2014), who explored and developed the program for enhancing student engagement and learning achievement. It was found that the students studying with the developed activity-based learning program were allowed to take part in learning. It caused the students to enjoy learning, become enthusiastic, and want to learn the content in the lesson. The results included learning achievement that is higher than the students who studied in normal class with a statistical significance. For the direct effect of Learning Engagement on Learning Achievement, it is found that Active Learning has a direct effect on Learning Achievement with no statistical significance. However, the variable has an indirect effect on Learning Achievement with Learning Engagement as a mediator variable. This may be mainly because of the teacher's ability to design the instruction. The teacher who encourages primary learners to take part in learning needs to carefully design the instruction that involves fun and attractive activities as well as knowledge. If the teacher's instruction emphasizes only the side of active learning and participation, the intensity of academic content or the accuracy of the concepts may decrease; otherwise, learners may be led to misconceptions about the lesson (Vongvithayasakul, 2014: Wonglorsaichon, 2012). However, if the teacher employs appropriate strategies or methods, learners will be likely to enhance their knowledge and ability and to have a higher degree of learning achievement (Gütl et al., 2015; Yoon et al., 2018).

Recommendations

The current research findings point out that motivation, active learning, and learning engagement have both direct and indirect impact on learning achievement. Therefore, in terms of instructional management in the present days, teachers should be encouraged and supported to be able to arouse learners' interest and enthusiasm for learning. They should be supported with resources and knowledge of instructional management and design which truly focuses on interaction and learning.

Conflict of Interest

There is no conflict of interest.

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