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แรงจูงใจและการเรียนรู้ของนักเรียนมัธยมศึกษาปีที่ 3 ในห้องเรียนวิทยาศาสตร์

สกลรัชต์ แก้วดี

วารสารครุศาสตร์
ปีที่ 45 ฉบับที่ 1 (มกราคม-มีนาคม 2560) หน้า 243-260

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Motivation and Learning of Ninth Grade Students in Science Classrooms

สกลรัชต์ แก้วดี

บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์ เพื่อศึกษาแรงจูงใจในการเรียนรู้และการเรียนรู้วิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 และศึกษาวิธีการเสริมสร้างแรงจูงใจในการเรียนรู้วิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 ประชากรในการวิจัย คือ นักเรียนชั้นมัธยมศึกษาปีที่ 3 และครูวิทยาศาสตร์ ผู้เข้าร่วมการวิจัย คือ นักเรียนชั้นมัธยมศึกษาปีที่ 3 จำนวน 315 คน และครูวิทยาศาสตร์ จำนวน 12 คน จากโรงเรียนมัธยมศึกษาของรัฐบาล 12 โรงเรียน ครอบคลุม 4 ภาคของประเทศไทย เครื่องมือที่ใช้เก็บรวบรวมข้อมูล ประกอบด้วย 1) แบบสอบถามแรงจูงใจในการเรียนรู้และการเรียนรู้ สำหรับนักเรียนประเมินตนเอง 2) แบบสอบถามแรงจูงใจ การเรียนรู้ และวิธีการเสริมสร้างแรงจูงใจสำหรับครูเป็นผู้ประเมิน และ 3) แบบสังเกตแรงจูงใจในการเรียนรู้ การเรียนรู้ และวิธีการเสริมสร้างการเรียนรู้ สำหรับผู้สังเกตการณ์ การสรุปข้อมูลแรงจูงใจและการเรียนรู้วิเคราะห์จากความสอดคล้องของข้อมูลโดยใช้การตรวจสอบแบบสามเส้าจาก 3 แหล่ง คือ นักเรียน ครูผู้สอน และผู้สังเกตการณ์ ส่วนข้อมูลวิธีการเสริมสร้างแรงจูงใจพิจารณาจากความสอดคล้องกันของข้อมูลครูผู้สอนและผู้สังเกตการณ์

ผลการวิจัย พบว่า 1) นักเรียนชั้นมัธยมศึกษาปีที่ 3 ส่วนใหญ่มีระดับแรงจูงใจในการเรียนรู้วิทยาศาสตร์อยู่ระหว่างระดับ ปานกลาง-สูง ถึง ระดับสูง และนักเรียนส่วนใหญ่มีแรงจูงใจในการเรียนรู้วิทยาศาสตร์จากภายใน 2) นักเรียนชั้นมัธยมศึกษาปีที่ 3 ส่วนใหญ่มีระดับการเรียนรู้อยู่ระหว่างระดับต่ำ-ปานกลาง 3) วิธีการเสริมสร้างแรงจูงใจในการเรียนรู้วิทยาศาสตร์ที่ครูส่วนใหญ่ใช้ คือ การกระตุ้นในเกิดการเรียนรู้ร่วมกันทั้งชั้นเรียน และการกระตุ้นแรงจูงใจของนักเรียนด้วยปัจจัยภายใน

คำสำคัญ: แรงจูงใจ/การเรียนรู้วิทยาศาสตร์/วิธีการเสริมสร้างแรงจูงใจ/นักเรียนชั้นมัธยมศึกษาปีที่ 3

Abstract

The purposes of this research were to investigate ninth grade students' learning motivation and science learning, and teachers' motivational strategies to support students' motivation. The research population consisted of ninth grade students and their teachers. The participants were 315 ninth grade students and 12 science teachers in 12 classrooms from public secondary school in 4 regions of Thailand. The research instruments consisted of a students' self-report questionnaire, teachers' self-report questionnaire, and an observation form for observers. The level of motivation and learning were collected from 315 students, 12 teachers and 2 observers, and were then analyzed by using triangulation. The consistency of motivational strategies collected from teachers and observers were examined.

The findings of the research can be summarized as follows: 1) Most of the ninth grade students' learning motivation rated at a moderate-high and high level. The majority of students reported that they had internal motivation to learn science. Most students were rated at a relatively high level of motivation; 2) most students' learning rated at low-moderate level; and 3) most teachers supported their students' motivation by encouraging them to learn with the whole class and by creating internal interest and a positive atmosphere.

KEYWORDS: MOTIVATION / SCIENCE LEARNING / MOTIVATIONAL STRATEGIES / NINTH GRADE STUDENTS

Introduction: Importance and Background of the Study

Students' motivation refers to degree of intention and effort connected to their willingness to engage in learning activities in the classroom (Wentzel, R. K. & Brophy, E. J., 2014). Students' new learning and previously learned performance and behaviors were affected by motivation. In contrast, students unmotivated to learn cannot take effort in their learning (Schunk, H. D., Pintrich, R. P. & Meece, L. J., 2014). Motivation influences students' learning and performances, as a reciprocal relation, their learning and performance influence motivation (Pintrich, R. P., 2003; Schunk, H. D., cited in Schunk, H. D., Pintrich, R. P. & Meece, L. J., 2014). In science classroom, motivation plays an importance role in students' learning (Bonney, C., Klemper, T., Zusho, A., Coppola, B. P & Pintrich, R. P., 2005). Students can be motivated to learn scientific concepts and ideas when they feel sense of control and greater responsibilities and enthusiasm toward their learning. Motivation is the most important factor influencing students' learning. Understanding students' motivation is essential for teaching profession because motivation acts as a central point to understand students' academic engagement in school (Eggen, D. P. & Kauchak, P. D., 2016; Ryan, M. R. & Deci, L. E., 2016). Science is one of the core subjects in Thailand's Basic Education (Ministry of Education, Thailand, 2008). School science curriculum aims to enable students learn science focusing on the connection of scientific knowledge, scientific process, investigative processes and problem solving to search information and construct knowledge (The Institute for the Promotion of Teaching Science and Technology, 2008). This research nationwide aimed to explore the motivation and learning of Thai students in science lesson, and teachers' motivational strategies to support students' motivation and learning.

Based on self-determination theory (SDT), people's performances were results of two kinds of motivations: intrinsic motivation and extrinsic motivation. Intrinsic motivation is driven by one's own inherent satisfactions; interests or enjoyable, and extrinsic motivation is driven by some outcomes or consequences separating from activity itself. (Deci, L. E. & Ryan, M. R., 2008; Niemiec, P. C. & Ryan, M. R., 2009; Ryan, M. R., & Deci, L. E., 2000). Intrinsic motivation provides an important basis for learning. When students are intrinsically motivated, they tend to learn better and are more creative, especially on tasks involving conceptual understanding (Niemiec, P.C & Ryan, M. R, 2009). However, this theory proposes that varies types of extrinsic motivation in degree to which they underline autonomous regulation of behaviors. Intrinsic motivation or intrinsic regulation is defined as highest autonomy, and motivation or non-regulation is defined as lack of autonomy (Ryan, M. R. & Deci, L. E., 2000).

STD also focused on three basic psychological needs intrinsically motivated tendency to learn. These essential needs consists of need for autonomy, competency and relatedness (Ryan, M. R. & Deci, L. E., 2000; Reeve, J., 2012). Autonomy refers to decision what to do and how to do one's desired activity. Competency involves how to develop skills for manipulating and controlling environment. Relatedness involves belongingness and connectedness with others in one's social environment (Deci, L. E., Vallerand, J. R., Pelletier, G. L. & Ryan, M. R., 1991). Students who perceived themselves during learning activities with sense of autonomy, competency and relatedness experience high motivation, whereas those who have these three needs neglected or frustrated experience low motivation (Reeve, J., 2012).

Students relatively get advantage when their autonomy were supported, but relatively get worse when teachers controlled their behavior. Autonomy-supportive and controlling supportive motivating style was defined as interpersonal and behavior teachers provide during instruction to motivate student to learn. Autonomy-supportive style teachers adopt students' perspective; invite students' thoughts, feeling, and behaviors, and support students' motivational development and capacity for autonomous self-regulation. Whereas, controlling-supportive style teachers engage from their perspective, intrude into students' thoughts, feeling, and behaviors, and pressure student to think, feel, or behave in particular way (Reeve, J., 2009, Reeve, J., 2012)

Science studies on motivation and learning were investigated level of motivation to learn science and attitude toward science, interest and their potential to motivate students, and type of motivation in science classes (Cavas, P., 2011; Guvercin, O., Tekkaya, C. & Sungur, S., 2010; Obrentz, B.S. 2001; Palmer, D. H., 2009; Saeed, S. & Zyngier, D., 2012; Yenice, N., Saydam, G. & Telli, S., 2012). Canvas, P. (2011) and Guvercin, Tekkaya & Sungur (2010) found that primary students in Turkey had a high level of motivation to learn science, and Canvas (2011) reported that students also had positive attitude toward science. Obrentz, B. S., (2001) found that self-efficacy, effort regulation, assessment anxiety and previous achievement were significant predictors of learning success. High performance students reported highest level of motivation and learning strategies use in science. Palmer, D. H. (2009) showed that the main source of interest in science classes was novelty, although choice, physical activity and social involvement were also implicated. Saeed, S. & Zyngier, D. (2012) found that intrinsic motivation assisted students' authentic engagement in learning and extrinsic motivation served to develop students' ritual engagement. Student who had both type of motivation showed different types of engagement in their learning.

Other related to motivation of science education examined instructional supportive students' motivation and learning engagement in science classroom (Anderson, M. H. & Nielsen, L. B., 2013; Bernacki, M., Nokes-Malach, T., Richey, E. J. & Beleky, M. D., 2014; Black, A. E. & Deci, E. L., 2000; Jang, H., Reeve, J. & Deci, L. E., 2010). Anderson, M. H. & Nielsen, L. B., (2013) indicated that students' motivation to learn science is stimulated by a range of different factors, with autonomy, relatedness and belonging apparently being main source of motivation. The teacher's combined use of question, uptake and high evaluation level was very important for students' learning process and motivation. Jang, H., Reeve, J. & Deci, L. E., (2010) found that autonomy support and structure were positively collated and both instructional styles predicted students' behavioral engagement. Autonomy support and structure related as complimentary. Smart, B. J. (2014) indicated that significantly positive correlation was found between teacher interpersonal behaviors and students' efficacy for learning science, value for learning science, mastery orientation, and students' construction of perspective of teacher cooperation behavior. Black, A. E. & Deci, E. L., (2000) found that students' perceptions of their instructors' autonomy supported increases in students' autonomous self-regulation, perceived competence, and enjoyment, and decrease anxiety. Autonomy support relate strongly to academic performance for students initially low in autonomous self-regulation. Bernacki, M., Nokes-Malach, T., Richey, E. J. & Beleky, M. D., (2014) found that students who wrote self-assessment of their competence and interest in science lesson showed higher endorsement of mastery goals and had greater situational interest. Situational interest increase predicted higher individual interest in the domain.

According to the literature and previous researches, students' motivation to learn science is important for science competence and academic outcomes. In Thai science education context, the previous researches on motivation were mostly master theses of which conducted for master degree and focused on students' achievement motivation, a causal relationship model development and an achievement motivation program development (Rodjanapriwong, W. 2003; Suppakitkumjorn, N., 1996). Vallin, M. & Akessen, S. (2012) observed teaching methods teachers used in an elementary school in southern Thailand and the results showed that a science teacher encouraged students to learn and gave them feedback an assessment. The walls of this school's science classroom were bright color walls and educational posters to motivate student to learn.

The information on students' level of motivation and learning, as well as, teachers' instructional strategies to motivate students to learn science. did not found. Therefore,

this research article will provide information on motivation to learn science of secondary school students and teachers' strategies to support students' motivation in classroom context. The findings will benefit to science teachers, teacher educators and teacher education institutions to better understanding about students' motivation and learning in real science classrooms. The study aims to discuss in the following questions: (1) what is the Thai students' motivation in science classroom?, and (2) how is the Thai students' motivation in science supported by the teachers?

Objectives

1. To investigate students' motivation and learning in science classrooms
2. To examine teachers' motivational strategies in science in science classroom

Data Collection and Methodology

The population for this study were ninth grade students and their science teachers in public schools in Thailand. The data was collected from twelve public secondary school in main 4 regions of Thailand: North, Northeast, Central, and South. Stratified sampling method was used to select the participants. Three schools of different sizes-small (fewer than 500 students), medium (from 500-1,500 students), and large (more than 1,500 students)-in one province were selected randomly to represent each region. One ninth science classroom in each school were chosen randomly by the school administrators. Three hundred and fifteen ninth grade students and 12 science teachers in 12 classrooms from 12 public secondary school were participated in this study.

After the science lessons, the teachers and students in each classroom were answered two questionnaires adopted from Loima & Vibulphol (2014, 2016). The questionnaires, students were asked to assess their own learning and motivation. The examples of learning items such as "I did learn all the topics of the lesson" "I did learn some topics" "I did not learn most of the topics". For motivation, the items such as "Instead of learning, I did something else during the lesson" "The topics was not interesting, they were important to learn" "I was strongly interested in the topics and had a good motivation" These items were converted into four levels of learning and motivation, composing of none, low, moderate and high. Moreover, the students were asked to assess their interest of learning science, for example, "I like learning and intended to learn" "I did not like learning but

the teacher was good, I liked his/her teaching". These items were categorized into types of motivations: intrinsic motivation; extrinsic motivation, and amotivation or lack of motivation to learn.

The teachers' questionnaires, the teachers were asked to describe learning and motivation of their students in order to assess level of students' learning and motivation. The examples of learning items such as "All students achieved learning goals at all levels" "Most of students did it at the satisfactory level" "Most of students did not reach the learning objectives".

In addition, the teachers were asked to select their teaching methods or strategies they used to motivate students to learn science from the list of 8 statements which were analyzed in term of autonomy-supportive or controlling instructional styles (Reeve, 2009). In this study, the motivating methods focusing on autonomy supportive style were used to enhance individual student's motivation development and autonomous learning capacity i.e. being patient to take time for adjusting their own self-paced learning and answering and relying on internal sources of motivation, e.g., interests, positive learning atmosphere. Whereas motivating methods focusing on controlling style were encouraging students at the group level for learning as a class; demanding students to behave in a certain way; correcting students' wrong or unexpected answers immediately; and motivating students using external sources, e.g., scores, punishment. However, a statement of 'paying special attention and giving support to the weakest students' was identified as method for students who need special care and attentions.

Moreover, the data of the motivating methods used in science classrooms also came from the observation by 2 researchers using questionnaires based-observation sheet with the same set of items in teachers' questionnaires to assess students' learning and motivation. These 2 researchers observed each science lesson as non-participant observers. They sat nonintrusively at the back of the classroom and noting down the observation sheet on their own during the lesson.

The collected data from three sources consisting of students' answers, teachers' responds, and observers' notes were qualitatively analyzed by triangulation to synthesized level of motivation and learning in each classroom. If the data collected from these three sources were consistent, the level of motivation and learning would be rated on one particular level as none, low, moderate, and high. If the collected data fell between two levels,

the level of motivation and learning were determined in a midpoint of the two level, such as none-low, low-moderate, or moderate-high. To categorize types of motivation, students' self-assessment on theirs were asked to describe the way of interest on learning science; intrinsic motivation or extrinsic motivation, were taken into account. The data collected from three sources were analyzed by two raters for their congruency, when the analyses revealed inconsistency, the two raters had to reconsider the data with some more additional information until the agreement could be set in a particular level. For the motivational strategies represented in each classroom, theses were identified by teaches' responds that conformed to the observed classroom activates.

Results

Thai students' motivation and learning in science classroom

There were four particular levels of students' learning motivation i.e. none, low, moderate, and high. 'None' signified no interest in the lesson, of which students did not pay any attention to learn the lesson but something else. Students with 'Low' level of motivation thought that although learning science was compulsory, it was not interesting. Students with 'Moderate' level of motivation thought that learning science was good. Students with 'High' level of motivation classified those with strong self-determination in learning science.

In the case that the analyzed data fell in-between two levels of motivation, or in a midpoint of the two levels, the motivation would be classified 7 levels, consisting of none, low, low-moderate, moderate, moderate-high, and high.

For science learning, same classification of level as learning motivation was applied to rated students' levels of learning. 'None' signified students who did not learn or understand the lesson and did not meet any learning objectives. 'Low' level of learning indicated students with class result satisfying who partly understood the lesson. 'Moderate' level of learning classified students with good academic records who understand the lesson well. 'High' level of learning indicated students with academic excellence who comprehended throughout the lesson and achieved all learning goals.

Table 1 showed that four levels of motivation were identified in science classrooms. Students in four out of twelve classes were rated at 'High' level of motivation and another four classes were rated at 'Moderate-high' level. For levels of learning science, there were three levels being rated. Students in seven classrooms were rated at 'Low-Moderate' level of learning and students in another three classrooms were rated at 'Moderate' level of learning.

Table 1 Levels of motivation and learning, and motivation types of nine grade students in science classrooms

Classes	No. of students	Level of motivation	Level of learning	motivation types		
				Internal (%)	external (%)	amotivation (%)
1	21	Moderate-High	Moderate	90.5	9.5	0.0
2	24	High	Moderate	87.5	4.2	8.3
3	34	High	Moderate	85.3	2.9	11.8
4	23	Moderate	Low-Moderate	95.7	4.3	0.0
5	23	Moderate-High	Low-Moderate	78.3	8.7	13.0
6	40	Moderate	Low-Moderate	75.0	0.0	25.0
7	17	Moderate-High	Low-Moderate	94.1	5.9	0.0
8	25	Low-Moderate	Low-Moderate	68.0	0.0	32.0
9	45	Moderate-High	Low-Moderate	60.0	22.2	17.8
10	13	High	Moderate-High	100.0	0.0	0.0
11	9	Low-Moderate	Low-Moderate	66.7	22.2	11.1
12	41	High	Moderate-High	75.6	7.3	17.1

According to students' self-assessment on their ways of interest and leaning science, most of students were intrinsically motivated in the classroom. In 'High' level of motivation classroom, more than seventy-five percent of students were intrinsically motivated, and less than eighteen percent were reported as lack of motivation to learn science. In contrast, less than seventy percent of students in 'Low-moderate' level of motivation classrooms were intrinsically motivated, and up to thirty two percent reported as lack of motivation. In addition, students in a relatively high level of motivation classrooms ('High' and 'Moderate-high' level of motivation) also commented about their feeling regarding the science lesson as follows: *'[I] enjoy and feel happy to learn because [I had] good motivation.' 'Today, because of teacher' teaching methods, I really understand the lesson' '[I] enjoy [the lesson], [because it was] easy to understand',* '[the lesson] *can be applied in everyday life'. 'The lesson is essential to learn' '[I'm] interested [in the lesson] because I liked science and I'd like to further my study [in this field of study]'.* However, students in 'Low-moderate' level of motivation classrooms gave only short comments as '[the lesson] was compulsory.

Teachers' motivating support in science classrooms

Based on the data from teachers and observers, seven motivating strategies were found in science classrooms except for correcting wrong or unexpected answers immediately. The table 2 shows students' motivation to learn and learning and teachers' motivating methods in science classrooms.

Table 2 Students' motivation and learning and teachers' motivating methods in science classrooms.

Classes	No. of students	Level of learning	Level of motivation	Teacher's motivating methods
1	21	Moderate	Moderate-High	Inconsistent among resources**
2	24	Moderate	High	B / C / D / F
3	34	Moderate	High	H
4	23	Low-Moderate	Moderate	A / D
5	23	Low-Moderate	Moderate-High	B / D / F/ H
6	40	Low-Moderate	Moderate	Inconsistent among resources**
7	17	Low-Moderate	Moderate-High	H
8	25	Low-Moderate	Low-Moderate	A / G
9	45	Low-Moderate	Moderate-High	H
10	13	Moderate-High	High	B / C / D / F / H
11	9	Low-Moderate	Low-Moderate	D / G
12	41	Moderate-High	High	H

Note* A. Demanding students to behave in a certain way
B. Paying special attention and giving support to the weakest students
C. Supporting individual student's motivation development and capacity for autonomous learning
D. Encouraging students at the group level for learning as a whole class
E. Correcting wrong/unexpected answers immediately
F. Displaying patient to allow time for students' self-paced learning and answering
G. Motivating students using external sources, e.g. scores, punishment
H. Relying on internal sources of motivation, e.g. interest, positive learning atmosphere

Note** There was no teachers' motivating methods occurred although teachers claimed that they had applied some.

Teachers in seven out of twelve classrooms motivated students to learn science by encouraging students at the group level for learning as a whole class, using internal sources of motivation, and creating positive learning atmosphere. However, none of teacher corrected students' wrong or unexpected answers immediately.

In 'High' level of motivation classrooms, five motivating methods-autonomy supportive style and controlling style-were applied, which were: (1) relying on internal sources of motivation, such as, students' interests, positive learning atmosphere; (2) encouraging students at the group level for learning as a class; (3) paying special attention and giving supports to the weakest students; (4) supporting individual student's motivation development and capacity for autonomous learning; and (5) allowing students to learn at their self-paced learning and waiting for students to answer the questions.

In classrooms with 'Moderate' and 'Moderate-low' level of motivation, three motivating methods with controlling style were applied, consisting of encouraging students at the group level for learning as a class; disciplined students to behave in a certain way; motivating students using external sources, e.g. scores and punishment.

Discussion

The purposes of this study were to investigate students' motivation and learning in science classrooms and examine teachers' motivational methods in science classrooms. The overall findings indicated that ninth grade students had a relatively high level of motivation to learn science and a relatively moderate level of learning science. Moreover, most of students reported that they had internal motivation to learn science. The relatively high level of students' motivation in this study was consistent to the findings of previous studies in Turkey of which students were motivated to learn science in high level. (Canvas, P., 2011; Guvercin, O., Tekkaya, C. & Sungur, S., 2010; Yenice, N., Saydam, G. & Telli, S., 2012). The finding also indicated that most of students in a relatively high level of motivation classrooms had intrinsic motivation to learn science. These findings correspond to the study of Canvas, P. (2011) which reported that students with high motivation to learn science had positive attitude towards learning science. Moreover, students with high motivation to learn science described their learning as intrinsic value related to enjoyment of the task or subject matter (Bonney, C., Klemper, T., Zusho, A., Coppola, B. P. & Pintrich, R. P., 2005) and utility value concerns perceptions of usefulness of the task, in terms of their daily life or life

goal (Bonney, C., Klemper, T., Zusho, A., Coppola, B. P., 2005). According to a relatively moderate level of science learning, this finding tend to consistency with the previous concerns about low performance in science of Thai students (Kanokkan, C. & Sakolrat, K., 2015; PISA 2012 Thailand, 2013; TIMSS 2011 Thailand, 2013; The National Institute of Educational Testing Service (Public Organization), n.d.)

Seven motivating methods were applied in science classrooms. These motivating strategies were corresponded to the study of Vallin, M. & Akessen, S., (2012) which reported that an elementary school science teacher in southern Thailand focused on students' needs and interests. The teacher motivated students to learn science by allowing time for students' discussion and feedback, as well as, encouraging students to work individual in group. These findings also consisted to the study of Anderson, M. H. & Nielsen, L. B., (2013) that reported interaction and activities observed in science classrooms composed of independent group work, teacher-assisted group, and teacher-guided discussion. Considering teaching methods and students' motivation, the teacher in highly motivated classrooms used both an autonomy-supportive style and controlling instructional style. This finding supports the previous research suggested that to enhance the full range of students' engagement, the teachers should provide students with an autonomy supportive and structure-based instructional strategies. It therefore possible that, autonomy supportive and controlling style associate with each other to enhance students' motivation to learn science (Jang, H., Reeve, J., & Deci, L. E., 2010), Unlike the science teacher in highly motivated classrooms, the teachers in moderate and moderate-low motivated classrooms used only controlling instructional style to motivate students to learn science.

In relative high motivation classrooms, the science teachers motivated their students to learn by using learning materials related to real life, providing challenge activities and presenting interesting information to enhance students' interest value. This result supports previous study reported that situational interest–the interests which students experience-has potential to arouse to nearly all students in a group, regardless of their pre-existing interest and motivational belief (Palmer, D. H., 2009). The teachers in high motivation classes provided positive learning atmosphere during the science lesson. The results from present study also indicated that the teachers had friendly and relax conversations and non-controlling communication. They allowed students opportunity to work on their own and work with peers, provided time and choices for student to work in their own way, as well as, provide scaffolding when it was need such as walking around and

offering helpful hints when student seem stuck. This result supports previous study reported that high motivated students described the most instances of teacher cooperative in science as helpfulness-teacher's instructional strategies, supportive behaviors, and availability-, and understanding-empathetic, slow to anger, individual attention and wait time (Smart, B. J., 2014). In additional, a motivating method with controlling style as encourage students at a whole class for learning science was observed in high motivation classrooms including explaining how to calculate the data, lecturing with learning materials. This finding consistent to previous study of Smart, B. J. (2014), of which indicated that students with high motivation described their science teacher's helpfulness in aspect of instructional strategies as organization, keeping students inform of due dates and assignment, planning engaging activities, monitoring students during work. Students viewed theses controlling instructional style was helpful in their learning of science.

In moderate and low-moderate motivation classrooms, teachers used controlling instructional style such as encourage students to learn as a whole class, discipline students behave in a certain way, and use external sources, rewards and punishment, to motivate students' science learning. Static students were forced to demonstrate an experiment in front of the class and students were induced to read textbook and to answer the questions without any task involvement. A controlled motivating style undermines students' positive functioning and outcomes because it is insufficient to support the full range of students' engagement and cause a sense of pressure and sense of others' obligation. Students relatively benefits from autonomy support and relatively suffer from being controlled (Reeve, J., 2009).

Conclusion and Suggestions

The present study investigated the level of motivation and learning of Thai ninth grade students nationwide in natural science classroom setting. The findings revealed that most of students' learning motivation rated at moderate-high and high but rated their learning at low-moderate level. An autonomy-supportive and controlling instructional style were applied in classes rated at a relatively high level of motivation, whereas a controlling instructional style was applied in classes rated at a relatively moderate level of motivation. To enhance students' science learning motivation, teachers should be autonomy-supportive, concerning students' interests, positive environment and students' autonomous learning.

Suggestions for promoting students' motivation to learn and learning science were as follows:

1) Science teachers should provide interesting, relevant, and enriched activities. This is because students were motivated by their own personal interests and by situational interests. Students revealed that fun learning activities, hands on science experiment and tangible learning materials were their preferences. Therefore, learning activities or tasks that generate students' positive and active learning should be designed to encourage students' curiosity, excitement, pleasure, and satisfaction when learning.

2) Positive atmosphere in science classrooms should be created, using non-controlling communication and relax-conversation. Time and choices for student to work in their own way, as well as, scaffolding should be provided.

3) Further studies should examine on students' responds on teachers' instructional behaviors using questionnaire and interview, to gather data on teachers' motivating support in science classrooms from another side of the angle. Beneficial information gathered from students will be of much help for teachers to develop their supporting strategies for motivating students' science learning.

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Author

Sakolrat Kaewdee Faculty of Education, Chulalongkorn University Phayathai Road, Patumwan Bangkok, Thailand. E-mail: sakolrat.k@chula.ac.th