



PISA Lessons: The New Approach of Learning Process for the Elementary Students' Competencies

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Abstract

The current world situation is the world of data information in which learners can access contents and data information easily; however, they still have insufficient skills and necessary property to utilize such knowledge. There is a number of factors that cause learners' quality is not satisfiable, e.g., teachers are still the center of the education as well as teaching by giving knowledge so that the learners are insufficient of systematic thinking and opportunity to practice. It can be considered that the learners lack of the learning process that encourages them to have the key competency. The concept that supports the key competency is Intelligence Quotient (IQ), which is not a good performance indicator for the works and overall success, whereas the competency is the expected performance indicator. This is because those who are successful in their works can apply their knowledge into their jobs. Therefore, the resolution for educational problems is to change the focus from content-based into competency-based education. Teachers, the direct persons who are responsible for the change of education system into classes. PISA is the lesson of mathematic skill practices which has been designed to be in accordance with PISA test. The lesson does not only focus on contents, but also the mathematical process and contexts at the same time. After applying PISA lesson with the 850-Grade-4 students, the result reveals that the sample group significantly archives the ability of mathematical process skills scores at 0.05. As a result, PISA lesson is the new learning process that can be the tool to support teachers for encouraging the learner's competency.

Keywords: PISA Lesson, Learning Process, Competency

Introduction

The current world situation is the world of data information in which learners can access any kinds of media easily and fast; however, no matter how much knowledge they can access, both educators and studies agree and conclude that the Thai learners' competency and quality is not in the satisfiable level. This is because the learners' "Processive Skills" are rather very low, and most of them cannot manage their knowledge to apply into daily lives (Panichsuay et al., 2018).

The reasons why Thai learners' competency is rather not satisfiable are perhaps because they lack learning processes that support learners to have key competencies, thinking process, learn the lesson to the meaning, practices, training, self-practice, communicative skills, presentative skills, teamwork skills and knowledge application into works skills, problems solving, and living. In addition, some performances need improvement such as learning by recitation which means no seeking for knowledge, no attempting difficult things, and learning for taking tests (Khammani, 2019). It can be thoroughly summarized that the learners are not encouraged to apply their knowledge from several subject areas and necessary skills for adaptation into real situation or similar to real-life situation. This is in accordance with the special expert of The Institute for the Promotion of Teaching Science and Technology (IPST), Sunee Klainil who speaks about mathematical education in Thai school level that even though there are new innovations for new mathematical curriculum, it is still the curriculum that emphasizes on the content, no application of society or real-life situation (Klainil, 2015, p. 4). This is all in agreement with the



PISA test guideline, which does not only emphasize content evaluation, but it also focuses on mathematical process and situations or contexts. Furthermore, according to the report of PISA evaluation, which emphasizes on the learners' competency on applying literacy including reading literacy, mathematical literacy, and scientific literacy, clearly summarizes that the learners' life success depends on the learners' competency (PISA THAILAND, 2019). As a result, it becomes the issue in which its learning-management strategies for learners are in seriously need of improvement.

According to the 2015 United Nations General Assembly, there is the direction for 15-year sustainable development strategies, which will be until 2030. One of the development strategies is to manage qualified education in which includes the performance indicator by increasing sufficient national qualified teachers to respond to the increasing educational needs (Quality Learning Foundation, 2015). Therefore, it is high time that educators, who identify the national educational management goals; and teachers, who witness the learners' weakness in which they cannot adapt knowledge, understanding, skills, and performances they have learned into works or daily lives; to change the learning process focus from content-based education into competency-based education (Office of the Education Council, Ministry of Education, 2019). However, the methodologies to manage education for the learners to archive the goal are not easy. The researchers have studies about benefits of PISA lessons towards mathematics learning process of elementary level students, which has been funded by National Research Council of Thailand in 2017, and found that PISA lesson, the specific practice for practicing mathematical process to respond the PISA test guideline which emphasizes the learners' competency, is perhaps one of the strategies to support learners' competency (Panichsuay et al., 2019).

This article will present the lessons into two types: the lesson to encourage initial competency and the lesson to encourage the competency to be outstanding. The details are as described below.

How Much Important is the Competency? What is its Meaning?

In 1973, DAVID C. McClelland, a psychology theorist, presents the concept of competency that it is more important than Intelligence Quotient (IQ) in the article named *Testing for Competency Rather Than for "Intelligence"*. His concept becomes the famous quotation that are frequently seen in academic articles about "Competency" that Intelligence Quotient (IQ) is not a good indicator for the overall success but the competency which is expected to be more successful in working. This reflects that those who are good at their jobs do not mean they are also good at studying; yet they are the persons who can apply principles or knowledge that they have into their jobs (Office of the Civil Service Commission, n.d.). Moreover, McClelland persuades those who are related to education to believe and trust in presenting his meaningful suggestion into practices, which is said "New measures really ought to be not grades in school, but Grades in life" (McClelland, 1973, p. 7).

Throwback to 30 years ago when the writer was a mathematics teacher at one of the most famous schools in Thailand, there was a student who was not good at mathematics have left the class for almost 2 weeks because that student had chickenpox. When the student was recovered and came to school, on the first day the writer told himself that within these 2-3 days or a week after this, he would sacrifice himself to make up the mathematics lessons, on the topic of money and spending money in daily life for Grade 2 students, for this student after school. This is the way to do of primary-school teachers that they have to make up lessons or teach intensive lesson for the students who are slower than the others in the class. When it comes to the appointment time, the writer does not even present the (brief) activity for the student to understand, the student already shows that the writer does not have to further introduce activities and descriptions. This is because the student understands and is ready to do



the practice. Unexpectedly, the student can learn and do the practices as well as challenging problems at the end of the lesson book fast and almost all correct. The reason is that the student has been well through the practices because the students help the parents at the cook-to-order restaurant. The student frequently serves, collects money, and gives changes to the customers, especially on the weekends. That second the writer truly believes that the student's competency is the result of having been taught, accumulated, trained, and real practiced from the various skills, e.g., calculating skill, communicative skill, problem solving, etc. As a result, this student is the complete learner with competency from real-life situations. Having read to this line, the readers should have a clearer concept of how competency means. Office of the Civil Service Commission (OCSC) identifies the meaning of competency that is "the behavioral performance gained from knowledge, ability, skill, and other performances that make the person outstanding in an organization" (Office of the Civil Service Commission, 2010). Office of the Education Council also identifies a similar meaning of competency that is "the individual competency in the level of being able to archive a curtain job by applying knowledge, skills, attitudes/performance; or the behavior that shows an individual's competency in successfully applying knowledge, skills, and individual performance into works or any kinds of situations" (Office of the Education Council, Ministry of Education, 2019). Speaking about the elements of competency, according to the mentioned meanings above, it can be summarized that competency consists of 1) knowledge; 2) skills; 3) self-concept, in which means the attitude, value, and opinions on the self-characteristics; 4) trait, in which is the permanent behavior such as a trustable person; and 5) motive, in which means inside motivation or drive that results in a person to behave (Khammani, 2019).

What is PISA Lesson and How is it Related with Learners' Competencies Encouragement?

In 2016–2017, Mr. Wichai Panichsuay and the team, funded by National Research Council of Thailand (NRCT), budget year 2017, conduct a research study titled *Effects of applying PISA Lesson on Mathematical Process Skills of Elementary Student (Phrase II)*. He study creates PISA lessons, which are the mathematical process skill practice related to PISA test guideline and emphasize on the learners' competency. The lessons are applied as the supplement lesson for mathematics class for 6–8 weeks, 2–3 times a week which takes 20–30 minutes each time. The sample group were 850 Grade-4 students from Bangkok and other regions e.g., Northern, Northeastern, and Southern schools. The results of the mathematical process measurement test for primary level manifest that its reliability is 0.73, items difficulty (p) is between 0.28–0.78, and discrimination value (r) is between 0.26–0.65 (Panichsuay et al., 2018). The result reveals that the sample group's score of mathematical process skill after taking PISA lesson is significantly higher than not taking the PISA lesson at 0.05 (Panichsuay et al., 2019). Mathematical process skill is considered the key factor of learning mathematics and has been added into the curriculum manual of mathematical education area (B.E. 2560 edition) (The Institute for the Promotion of Teaching Science and Technology (IPST), Ministry of Education, 2018). The mathematical processes that need improvement for learners are identified; for example, abilities of problem-solving, reasoning, communicating, mathematical conveying, and presenting, connections of any kinds of mathematical knowledge and mathematics with any kinds of knowledge, and creativities. This specific knowledge, competency and skill are all the key factors to encourage the learners' competency.

Application PISA Lesson into Classes

The writer designs the PISA lessons into 2 types as following:

1. Beginning Competencies
2. Differentiating Competencies



Beginning Competencies

PISA beginning competencies lesson is the lesson to train mathematical process skill for the learners to have basic competency. After the lesson when the learners will understand and know calculating skill for a certain context, the teacher applies PISA lesson in this step; for instance, about seeking for the parameter and rectangle, the teacher applies the PISA lesson titled “A Tile Technician” into this learning process. The teacher explains and describes the principle and solution at the initial part of the lesson, then they apply their knowledge and solution skill into the second part of the lesson.

Before the class starts, the teacher and learners talk about issues that connect to the title to practice; for example, the teacher introduces a problem that “Pong wants to cover the 30 x 30 square centimeters tiles of the empty area in a rectangle house size 3 x 4 meters. How many tiles does Pong have to use?”. During learning and sharing in the class, the teacher supports information so that the learners will completely get principles/methodology/ reasonable thinking in each lesson.

Example of Beginning Competencies PISA Lesson

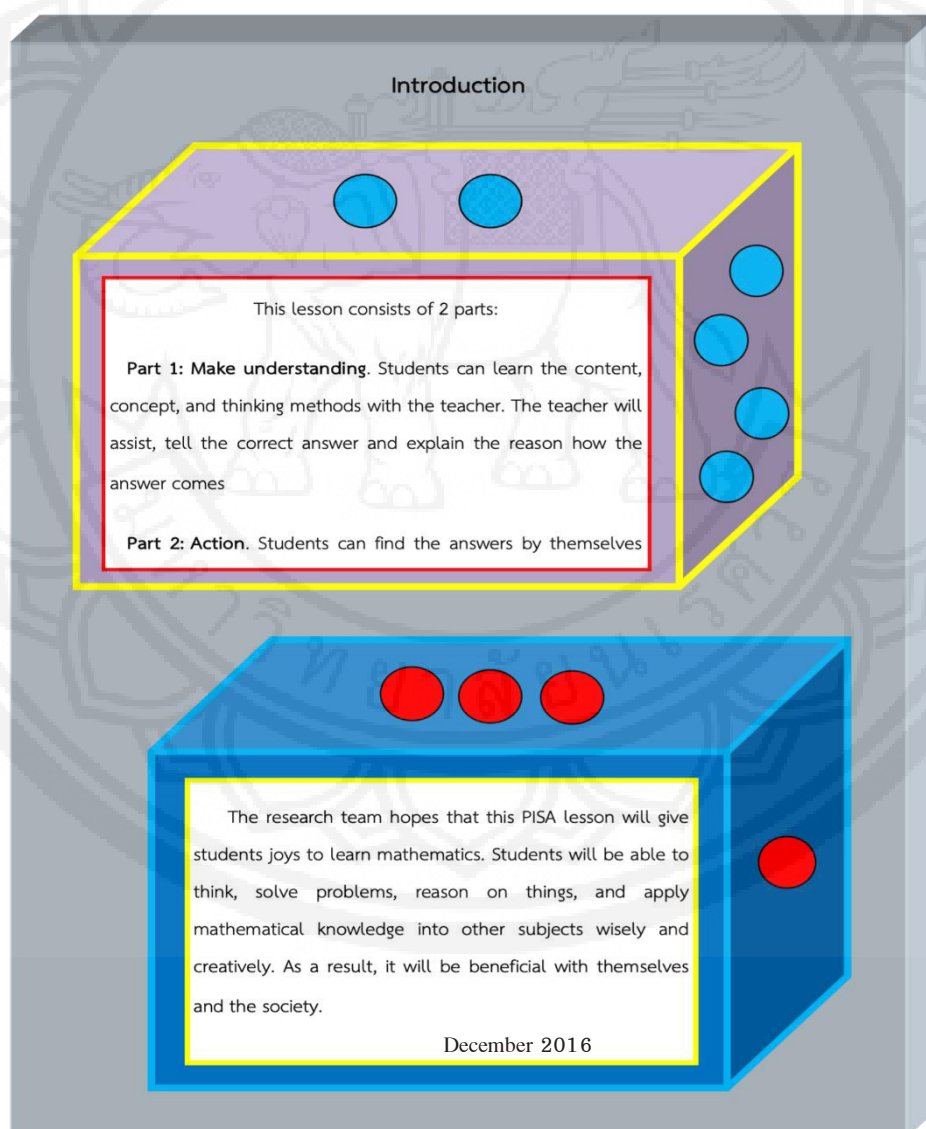


Figure 1 Introduction of PISA Lesson.

Source: Panichsuay et al., 2016

Title "A Tile Technician"

Part 1: Understanding the Problem

Kong's father wants to have the tiles covered within a square house in order to make this area a place to relax. His father asks him to measure the empty area in order to buy the tiles for it. Kong uses a rope to surround the empty area, stretch it; and the rope is 12 meters long. The tile for covering the area is also in a square shape with the size 30-centimeter long each side (1 meter is equal to 100 centimeter).

Write a ✓ sign in ☐ in front of the correct answer

1. How long does the empty area need to be covered by the tiles?

- ☐ 3 meters ☐ 6 meters

2. What size of the area to be covered by the tile is?

- ☐ 9 square meter ☐ 36 square meter

3. How many tiles to cover until the area is all covered?

- ☐ 40 tiles ☐ 100 tiles



The tile

Part 2: Practicing

After covering the area for afternoon relax, let's move to the evening relaxing area. The area to be covered the tiles is rectangle with the size of 3-meter side. The size to walk thorough the porch is 13 meter and 20 centimeters (1 meter is equal to 100 centimeter).

Write the ✓ sign in ☐ in front of the correct answer or write the answer on the blank line

1. How many meters and centimeters do the porch needs to be covered by the tiles?

- ☐ 3 meters 60 centimeters ☐ 7 meters 20 centimeters

2. If we use the 30 x 30 square centimeters to cover thorough the area, how many tiles do we need to buy? How much do we have to pay for the tiles?

2.1 Buy plates of tiles

2.2 Spend baht for the tiles

3. If we want to walk around the porch for 100 meters, how many rounds do we have to walk at least?

.....



53 baht/plate

Notice: Modified from PISA lesson for primary level used in the research study and the real items are more than presented in this article.

Figure 2 Example of PISA Lesson Title "A Tile Technician".

Source: Panichsuay et al., 2016



Differentiating Competencies

After having practiced the process and supplemented beginning competencies, the teacher should encourage the learners to apply their knowledge, understanding, process skill, and the existing competencies, and let the learners test their performance. Even though this is not the real-life situation, it is a good opportunity to show their full competencies to improve differentiating competencies. The learning process in this step, the teacher only facilitates and gives some advice when asked.

Examples of PISA Lessons to Improve Differentiating Competencies (Panichsuay, 2012)

The sample being explained afterwards is the works from Grade-5 students, Academic Year 2002 (approximately) from Kasetsart University Laboratory School Center for Educational Research and Development, Faculty of Education, Kasetsart University. The students make a report to their advisor of independent activities and Self-development Subject. This subject contains several independent activities in which the students can choose to join by their interests, and the advisor does not need to be their classroom teachers. The independent activities and self-development that the writer is the advisor, with the group activity names "MATH Mai Mome", meaning in Thai "Mathematics' Presumption".

The learning process starts from the teacher introduces problems/situations and let the students group themselves for work presentation. The students have 2-3 week, approximately, or slightly longer for one work (the activity is held 2 classes a week, with 50 minutes per class. The classes are held at the last class on Fridays).

A Little Architect

Pong's house is a two-story house in which his father bought three years ago with the very cheap price because it had been an old house before, especially its upstairs that looks a lot older. So, the family members live only on the downstairs story. However, in the next three months, his grandmother is going to live with, so his father needs to renovate the upstairs to welcome the grandmother. He will let Pong, a 10-year kid, and Tor, an 8-year brother of Pong, to live upstairs with their grandmother. Therefore, Pong's father asks him to be an architect to design the upstairs floor with the below information.

- The area is a large hall in the rectangle shape, size 20 x 30 square feet.
- They need three bedrooms and one bathroom, four rooms in total.
- Those four rooms must be the two-large room with the same size whereas the other two room's sizes are the same and smaller than the first two.
- The aisle is in the middle of the hall, with the size of 20-feet long and 4-feet wide.
- Pong requests the large room for himself, his father approves. He is allowed to allocate the other three room appropriately.

Samples of the Students' Works (Cover – Page 5)

Report

Title: A little architect

Presented to
Teacher Rawiwan Puangwichit
Teacher Wichai Panichsuay
by
Miss Chayada Chotimongkol G.5/1
Miss Natnapas Lekphet G.5/1
Miss Arusa Chaichana G.5/1

This Report is a Part to fulfill the
Independent Activities
and Self-Development Subject
(Mathematical Subject Area)

Upstairs Plan

Scale: 0.5 cm. per 1 foot

Grandmother's door room

10 feet
14 feet

Pong's room size is 140-square feet (10 x 14), including 2 doors: the first one is to the hall while the second one is to the grandmother's room. The reason why Pong's room is next to grandmother's room is because Pong can take care of his grandmother conveniently. The room wall color is white. The floor is fishbone-shape Parquet because the white color makes the room look clean. There are three windows in the room.

Door to the hall
Door to Pong's room

Grandmother room size is $10 \times 14 = 140$ square feet. There are two doors: the first one to the hall and the second one to Pong's room. The reason why grandmother's room is next to Pong's room is because in case of emergency, Pong can take care for her. Her room's wall color is white while the floor is white Parquet so that the room will look clean and bright. There are three windows in the room.

Door to the bathroom

Door to the hall
Door to the bathroom

Tor's room size is 120 square feet with two doors: the first one is to the hall and the second one is to the bathroom so that he can go to the bathroom conveniently. The room wall color is white, and the floor is Parquet because white makes the room bright

12 ฟุต

Door to the hall
Door to Tor's room

The bathroom is $10 \times 12 = 120$ square meters with two doors: the first one is to the hall which the second one is to Tor's room so that Tor can go to the bathroom easily. The floor is slip-protect tiles in white and pink color. The wall is the white and pink color. The plumbing fixtures are pink color.

Notice

1. The writer tries to present all the students' work titled A little Architect that is presented in this article. The descriptions of each room's sizes and characteristics are types because of some students' writings are quite hard to read. All the descriptions are not changed by the writer.
2. Thank you to the students who own this work (as names shown on the cover)

Figure 3 Example of PISA Lesson Title "A Little Architect".

Source: Panichsuay, 2012



The Learners' Competency from PISA Lessons

When considering two types of the PISA lessons, it is obvious that they are the lessons that differ from the practices in the regular lessons. Regular mathematical practices, no matter what contents, contain calculating part (plus, minus, multiple, and divide), and the problem questions. In the problem part, if the learners can analyze the question, they will be able to apply the above-mentioned calculating skills. For PISA lessons, on the other hand, when the learners understand the problems/situations, thinking for the answer by applying only calculating skills is not enough. They must rely on other higher-order thinking skills such as reasonable thinking, problem-solving thinking, critical thinking, etc. to support their decision until they get the answer. In some cases, there can be more than one answer. These higher-order thinking skills are the skills or knowledge to lead the learners to the better practices, clearer and more appropriate achievements (McNeill, 2019). Moreover, to thoroughly consider the second type of PISA lessons, it manifests that learning process and work process rely on knowledge and various skills including mathematical skills, Thai language skills to present the concepts and reasons, writing skills in which reveals the aesthetics and creative thinking.

In addition, the presented work is in accordance with the teaching methods of mathematical problem-solving process in Singapore, which identifies three focuses: 1) reasoning, to convey and connect the meaning; 2) application and creation of an appropriate work; and 3) thinking skills that has been found by the learners themselves (OECD, 2016, p. 16). Conclusion, PISA lesson can respond learning competencies which focuses on core competency and not to stick with the content. It can be further developed to the learners for other areas of learning. Moreover, it is the learning management that focuses on the learners' competencies and differentiated instruction.

Conclusion

Because of the rapid development of technology, the world is in need to adapt for the advance and all kinds of changes, Thailand also needs to adapt and move the nation forward to the sustainable development. However, the sustainable development needs the corporations among every section, both organizations and persons, from those who define policies to those who are in practical level. In case of education, Office for National Education Standards and Quality Assessment (Public Organization) considers that "the new-gen teachers", who are the key person to manage learning, are not only required to be able to apply technological skills, but they also need to be able to stimulate the learners to have systematic thinking. They need to change from being a teacher into the mentor and listener so that the learners can completely develop themselves, know life skills, and have more immunity (MGR Online, 2020). This is considerably in accordance with the learning management by applying the presented PISA lessons. This is since PISA lessons can rank the learners' learning process from applying knowledge from the lessons into the practices, by using a variety of skill processes, i.e., problem-solving process skills, reasoning process skills, communicative process skills, conveying mathematical meanings and presentation process skills, and mathematical knowledge connection with other fields of study creatively, into the practice field. During the way of learning, the learners can be encouraged to be reasonable, being able to adapt and solve problems in any situations, as well as be the society desired characteristic persons. It is completely belief that PISA lesson is the one of the new learning processes that is appropriate with the current social contexts, in which needs those to can apply competencies as the results of the National Education Management goals.



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