



TEACHING PHILOSOPHY STATEMENT FOR PHYSICS TEACHERS: LET'S THINK ABOUT

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ABSTRACT

The statement of teaching philosophy reflects on teachers' growth and dedication to achieve the goal and values. Concerning philosophy, physics is the most fundamental science discipline which has profound philosophical implications. This article aims to discuss the importance of the teaching philosophy statement (TPS) for sustaining the teaching-learning process in the classroom. Moreover, it also includes the authors' TPS in teaching physics. This academic paper employs the systematic literature review and narrative literature review to explain scholarly opinion regarding teaching philosophy among physics and natural sciences philosophers. Three educational implications have been discussed. First, educators need to realize that not every student wants to be a physicist, and teachers need to manage this problem. More often, the physics teachers also have to think about addressing students with different abilities in the classroom. Second, as the facilitator of the learning outcomes, the teachers must possess good character and value-laden attributes necessary for teaching. Finally, the researchers of this study provide the TPS for physics, "Let Us Think About," and philosophical implications in teaching physics. The term of teaching philosophy may vary based on the expert who writes it and its application in the classroom (i.e., philosophy in science teaching, philosophy of physics, philosophy of science in teaching, teaching philosophy, teaching statement, and teaching philosophy statement). However, the teaching philosophy statement is the most common phrase since Beatty et al. explain the concept in the early 21st century. In addition, the finding indicates that TPS is important for developing teachers' way of thinking in the classroom setting.

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Keywords: physics; teaching philosophy statement; personal source

INTRODUCTION

In many schools and universities, a philosophy of teaching statement is considered part of the dossier for promotion and tenure and the faculty candidate application package (Eierman, 2008; Drolet, 2013). This necessity of teaching philosophy can stimulate reflection on teaching, assist teachers in evaluating their growth, and reaffirm their commitment to the goals and values (Chism, 1998). In other words, the teaching philosophy statement can visualize what the teachers will do, what the teachers can do, and what the teachers do, including educators and physics teachers.

Physics is the most meaningful component of science, and it is a scientific discipline with profound philosophical implications (Kabil, 2015). However, students may often encounter more difficulties in physics learning than their instructors may have realized (Redish, 2005a). Many teachers do not believe that the fundamental problem that may lead students to fail to understand physics is that it does not make sense to them (Kabil, 2015). Instructors need to imply the main purpose of learning physics, whether it is about answering the question in examination or knowing how the natural system operates. Teachers' requirement that is emphasized to students (e.g., too much examination) guide philosophical implications in physics may be lost.

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For example, instead of answering the equation in the examination, Redish (2005b) describes a way of philosophical thinking. He proposes a model on how to use mathematics in the context of physics; firstly, discerning a physics system to be described; secondly, mapping the physical structure into a mathematical model; Then, in the subsequent step, transforming the initial description into some mathematical manipulations; after that, interpreting the findings in physics terms once again; finally, determining if the results are consistent with the physics system chosen at the beginning. These steps help students not only learning mathematical models but also thinking the essential meaning of physics itself.

The crucial thing that may appear in teachers' minds is why teachers need to learn philosophy and how physics classrooms are constructed to prepare future physicists. However, not every student wants to learn physics and showing some interest in becoming a physicist. Everyone does not need to be Einstein, nor someone like Muhammad Ali, Michael Jordan, or even Jack Ma. Teachers cannot force the students to become something teachers wanted them to be, including scientists. Moreover, there is something that the students need to learn from physics courses, i.e., the thinking skill. Students' ability from the physics classroom will be useful when facing specific problems shortly, including synthesizing solutions to difficult problems and logical reasoning. Eger (1972) states that science influences society through its technological elements and provides new insights and opportunities for new attitudes.

Above all things, the essential reflection for teachers is by asking who set forth the theory of relativity, is it a scientist or a philosopher? Then, the person who discovered the quantum theory, is

it a scientist or a philosopher? People know many leading physicists that have caused a significant change in the history of physics, and without any doubt, they are philosophers (Kabil, 2015).

The fundamental nature of physics catches the authors' attention in exploring what teaching philosophy statement might bring to be suited for the course. This article aims to discuss the importance of the teaching philosophy statement (TPS) for sustaining the teaching-learning process in the classroom. Similarly, this article also intends to discuss the authors' TPS in teaching physics.

METHODS

The method employed in this article was a mixed method. The researchers use the systematic literature review and narrative literature review. The main focus of this research was to discuss it in a systematic way to assure the trend and look for the first scholar that mentioned this issue. Subsequently, the authors utilized the Narrative Literature Review to explain the views and opinions of the scholar about the issue of teaching philosophy. The literature source for the systematic literature review was the Scopus Index database, one of the highly recognized databases indexing journals. The document type was limited to journal articles to review potentially more reliable and consistent studies. Systematic reviews could benefit by synthesizing prior work, informing practice, and identifying critical new directions for research (Borrego et al., 2014). For instance, some researchers try to find the trend of eye-tracking study in education (Lai et al., 2013) and virtual reality in physics education (Budi et al., 2021). The procedures implemented to identify the research papers of this study could be classified into four stages (Figure 1).

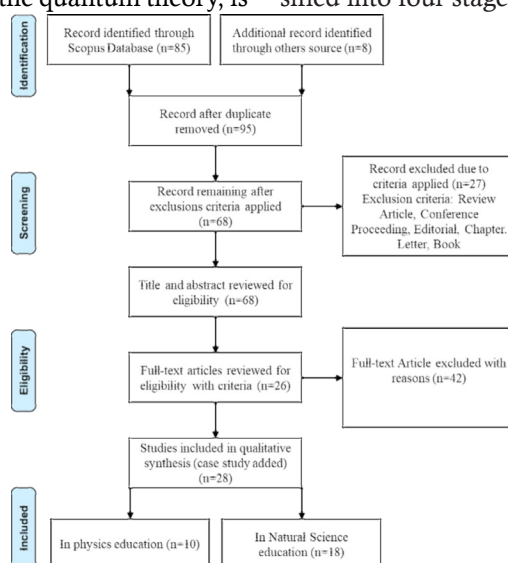


Figure 1. Systematic Literature Review

In the first stage, four sets of keywords were organized for searches using the Boolean operator 'AND,' including "teaching philosophy* AND physics," "teaching philosophy AND science," "teaching statement* AND physics," as well as "teaching statement AND science." When the results were produced, the researchers classified the subject areas to physics, natural science, educational psychology, education, and educational research.

In the next stage, the authors manually and systematically screened the article titles and abstracts, confirming that the selected articles did not include the philosophy of science in the general field because the main focus of this article was to determine the importance of teaching statement philosophy for teachers in physics and natural science. Finally, 28 papers were identified as the research sample of this review (see the data availability at doi.org/10.17605/osf.io/azypv). The content analysis was preliminarily coded based on its learning topics to specify different aspects of teaching philosophy. The literature in the Scopus Index database was limited to journal articles to review studies of potentially more reliable and consistent quality.

Furthermore, the narrative literature review aimed to synthesize existing studies that discover the perspectives of several issues (i.e., teaching philosophy in physics) and focuses on theories of scholars who explain some phenomenon (Knopf, 2006). For example, some researchers use this approach to explain perception regarding ecopedagogy (Hung, 2014) and discover the connection between teaching philosophies, educational philosophies, and the philosophy itself (Beatty et al., 2009b).

RESULTS AND DISCUSSION

The teaching statement is sometimes referred to as "statement of teaching philosophy" and captures the statement's purpose of teachers in the classroom (Oxley, 2015). Overall, from 28 reviewed articles, authors find some articles using the term in philosophy of science teaching (2 studies) (Matthews, 1988; Pospiech, 2003), philosophy of physics (6 studies) (Seeger, 1960; Crowe, 1999; Noll, 2002; Scott, 2015; Rajapaksha & Hirsch, 2017; Bächtold & Munier, 2019), philosophy of science in teaching (5 studies) (Terhart, 1988; Matthews, 1990; Elkana, 2000; Teixeira et al., 2012; Henke & Höttecke, 2015), teaching philosophy (2 studies) (Kurki-Suonio, 2011; Bartholomew et al., 2012), teaching statement (1 study) (Oxley, 2015), and teaching philosophy statement (12 studies) (Beatty et al., 2009a, 2020a, 2020b;

Grundman, 2006; Eierman, 2008; Kearns & Sullivan, 2011; Alexander et al., 2012; Drolet, 2013; Supasiraprapa & De Costa, 2017; Laundon et al., 2020; Merkel, 2020; Trellinger Buswell & Berdaniel, 2020). The most common words mentioned by the researchers on this issue are the teaching philosophy statement (TPS). Therefore, in this article, the authors use the TPS consistently.

Since the early 20th century, the discourse to combine the study of physics and natural science with philosophy has been widely known through the opinions of many experts such as Seeger (1960), Matthews (1988, 1990), Terhart (1988), and Crowe (1999), earlier than that, Duhem (1906) offers important suggestions about how physics progresses and also how physics shall be taught. In the reviewed articles, philosophy has a similar meaning to the philosophy of science as an effort to understand the phenomenon through empirical evidence that has influenced education for the last three hundred years through an interaction between the philosophy of science, teaching of science, and science itself (Elkana, 2000). The philosophy of science focuses on applying the principle of deep thinking related to existing issues, such as applying the gravitational redshift concept and reconstruct it to be easily understood using a philosophical implication (Scott, 2015).

The teaching strategy using philosophy could improve students' understanding clarified by Bächtold & Munier (2019) (N = 95). They examined the students' understanding of energy transformation and conservation theory which remains one of the main challenges when teaching physics. In this article, the philosophical approach in physics studies, authors identified as the term of philosophy of physics.

Furthermore, the philosophical approach is considered a great idea to implement in schools. The efforts to guide teachers using this approach are widely accepted. In the early 21st century, the term of teaching philosophy statement begins to become well-known since Beatty et al. (2009) explain the concept through 2 articles, i.e., "Philosophy rediscovered: Exploring the connections between teaching philosophies, educational philosophies, and philosophy" and "Finding our roots: An exercise for creating a personal teaching philosophy statement" which finally lead him to win the 2020 JME Lasting Impact Award from Sage Publications (Laundon et al., 2020). Although, according to the publication records, Chism (1998) and Goodyear & Allchin (1998) has introduced the teaching philosophy statement term earlier, however, the impact is not as widespread as Beatty.

Fundamentally, in writing TPS, we are being asked to describe what we are aiming to achieve in a class (Oxley, 2015), how we will go through to achieve these goals (Laundon et al., 2020), and why we do it in the classroom (Beatty et al., 2020b). TPS also represents the process of drafting a philosophy that offers an opportunity to develop teachers' reflections (Beatty et al., 2020b). For example, since teachers will be teaching mathematics, part of the philosophical statement shall address how they view mathematics, how it influences, and how teachers teach (Oxley, 2015). Every course and institution has different conditions. That is why teachers need to find their teaching philosophy by themselves based on their experiences.

To make TPS, teachers need to find the most appropriate word to represent who they are. Teachers also need to find insights from linguistic resources because they can mobilize to construct a powerful and unique teaching philosophy statement (Supasiraprapa & De Costa, 2017). Another consideration for designing TPS is the role of pedagogical strategies and available resources that can help teachers improve their statements (Merkel, 2020). TPS can be a powerful tool in uncovering teaching assumptions, declaring our values as educators, and connecting to a community within or across disciplines. TPS is often an integral part of job applications, tenure processes, teaching development, and teaching awards (Laundon et al., 2020). This idealization of TPS represents the vital state of this issue. For example, Albert Einstein, one of the most famous physicists globally, said that "Everyone is a genius. However, if a person judges a fish on its ability to climb a tree, it will live its whole life believing it is stupid." His philosophical statement is related to the concept of progressivism by John Dewey that took into account the students' individualities (Radu, 2011).

Therefore, the TPS can also illustrate teachers' methods, justify why they use those methods, analyze their effectiveness, and consider how they might appropriately modify those methods in future courses (Kearns & Sullivan, 2011). Then, the authors conclude that TPS is widely engaged in the educational field from many researchers (e.g., Oxley, 2015; Supasiraprapa & De Costa, 2017; Laundon et al., 2020). Unfortunately, some educators only create TPS as a normative ritual for a job interview without any theoretical foundation. Ideally, the core of creating TPS shall offer a process of reflecting on how teachers think about the student learning process and how their teaching strategy can enable learning (Beatty et al., 2020a).

Beatty et al. (2020b) suggest step-by-step instruction for educators to create TPS. Firstly, teachers need to find the teaching concept from the classroom, either good inspiration or bad experience. Secondly, teachers connect the teaching concept to philosophical traditions that are most influential in their minds. This step aims to compare philosophical grounding and patterns of educator's concepts. Finally, after reflecting on the themes and philosophical traditions, the educators must create a thesis sentence or a whole paragraph. In this step, educators need to think about why the statement is reflective of their teaching philosophy.

The authors' TPS in this article "Let's think about" is inspired by the philosophy of progressivism by John Dewey that takes into account the students' individualities, stimulates teachers' creativity, and focuses on a practice-based education (Radu, 2011), and also by the cognitive development by Bloom et al. (1956). The authors indicate "Let's Think About," which embodies TPS (Figure 2) because the teachers need to deliver the physics material not only using the equation but also delivering the benefits of learning physics. Similarly, the students will integrate these learned ideas to acquire additional knowledge in a given area of expertise. However, some physics students often struggle to grasp the content of the physics formulae and have difficulty in making conceptual sense of their laboratory exercises (Kurki-Suonio, 2011). To avoid this kind of situation in the classroom, the teacher needs to think in a philosophical way of using various thinking processes.

The process of learning is beyond infinity. Through TPS, it creates the notion of being a successful teacher through teaching and learning experiences in the classroom. Degen (2014) states that every student in the class has different intellectual giftedness. The ability of the teachers to interpret the unique educational needs can be a powerful tool for successful teaching.

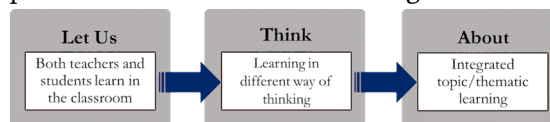


Figure 2. The Correlation Between Three Indicators of Teaching Philosophy Statement in Physics

Firstly, the philosophy of "Let Us," teachers as facilitators in class need to study with their students. Moreover, both teachers and students need to collaborate in the teaching-learning process to learn, think, and solve problems. Meanwhile, the growth processes can occur at schools under some conditions, such as the readiness and responsibility of school authorities

for innovative processes. The knowledge in an organization cannot be achieved without cognition and the growth mindset of the stakeholders, particularly for the teachers, students, and parents (Anastasia & Xenia, 2005). This condition suggests that teachers need to prepare the learning materials and are always eager to explore new knowledge, especially in the social-pedagogical issue. Teachers require a vast amount of creativity, ideas, techniques, and methods to promote students' learning value by considering students' abilities that may differ from other students (Geršicová & Barnová, 2018).

Teachers need to communicate their TPS in the learning process and convey teaching-learning expectations through writing, oral, and nonverbal cues in the classroom. After that, students will understand the purpose of the teacher in doing so (Way, 1993; Cerbin, 1996; Goodyear

& Allchin, 1998). Teachers shall realize that the sources of knowledge are not only from books but also from students through discovery learning among them.

Secondly, the philosophy of "Think." Utilizing various thinking skills in physics education may improve student's abilities as time passes. Flavell (1979) outlined the metacognitive responsiveness of accepting the knowledge of students' mental functions. On the other hand, "thinking about thinking" is termed informally to indicate cognition to react to specific individuals' thinking processes. Likewise, it is vital for having successful learning outcomes adhering to the global standards in education. Relative to this, there are seven skills that the teacher may use in delivering physics topics, as shown in Figure 3.

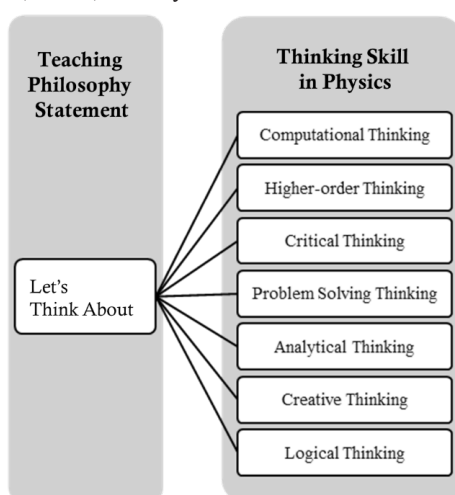


Figure 3. The Various Thinking Skills in Physics

The education scholars have conducted various researches aiming to provide thinking processes in physics education. Some of them may enhance their thinking skills using simulation (Bakri et al., 2019), learning material (i.e., open online course (Serevina & Andriana, 2019), and virtual labs (Gunawan et al., 2018), STEM (Science, Technology, Engineering, and

Mathematics) approach (Soros et al., 2018), and various learning models (i.e., Guided Inquiry Learning (Maknun, 2020), Ethnos Science-Based Direct Instruction Learning Model (Risdianto et al., 2020), and Problem-based Learning Model (Sari et al., 2019). As shown in Table 1, There are many suggestions from previous studies to construct better conditions in the classroom.

Table 1. The Previous Studies about Thinking Skills in Physics

No	Thinking Skill	References
1	Computational Thinking	(Hutchins et al., 2020; Mulyati et al., 2020)
2	Higher-order Thinking	(Bakri et al., 2019; Ramadhan et al., 2019; Serevina & Andriana, 2019)
3	Critical Thinking	(Soros et al., 2018; Maknun, 2020; Risdianto et al., 2020)
4	Problem Solving Thinking	(Gunawan et al., 2018; Soros et al., 2018)
5	Analytical Thinking	(Sari et al., 2019)
6	Creative Thinking	(Hakim et al., 2017)
7	Logical Thinking	(Bektasli, 2006; Marušić & Sliško, 2017; Muzaky & Sunarno, 2020)

Thirdly, the philosophy of “About.” In the physics discipline, students can learn various branches of physics. Generally, physics has four main objects, from the slowest particle (e.g., daily human environment) to the fastest particle (e.g., light) and from the larger object (e.g., observable universe) to the smallest object (e.g., quark particle) as shown in Figure 4.

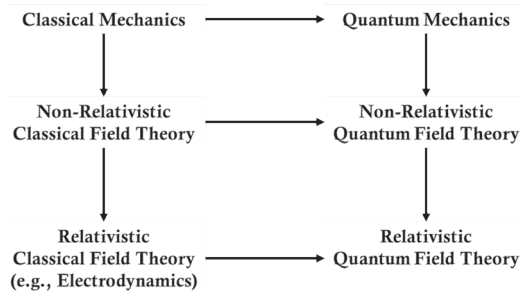


Figure 4. The Branches of Physics (Kuhlmann & Stöckler, 2018)

As shown in Figure 4, the branches of physics are categorized hierarchically, from classical physics through Newton’s studies to quantum physics. Classical physics, such as Newtonian physics and the laws of motion, branches into electromagnetism, fluid mechanics, and classical mechanics. Then, quantum physics is the last section discussed, focusing on atomic theory and condensed matter physics (Rogers, 2016).

Many scholars in physics try to combine teaching physics with philosophy; this approach is known for the first time from Pierre Duhem (Crowe, 1999). Duhem’s analysis offers essential suggestions about how physics progresses over time and how physics shall be taught. Duhem (1906) states that the fruitful method for preparing students to get a physical hypothesis is through historical and philosophical methods to describe the long collaboration of common sense and deductive logic, thus, triggering a correct way and clear view of the living organization of science.

Scott (2015), another researcher of a philosophical method in physics, gives some analysis from the history and philosophy of physics, offering a valuable resource for learning and clarifying problems in redshift teaching. Indeed, early attempts to derive the gravitational redshift straightforwardly were riddled with errors, ambiguities, and confusion, which lasted for the following two decades. He believes that the subject should be addressed carefully in introductory relativity theory textbooks.

Implementing the history and philosophy of science into science teaching is a longstanding objective. Curricular standards in several coun-

tries suggest that the history and philosophy of science is an appropriate instructional strategy for promoting a deeper understanding of science content, developing higher-order thinking skills, and acquiring adequate knowledge of the nature of science (Henke & Höttecke, 2015; Ayık & Coştu, 2020). However, this approach is hindered by the educators’ readiness and the depth of physics materials teachers possess in the classroom. Ideally, this approach will significantly bring students closer to the actual physics state applied in daily life. This approach in physics education may also foster mature students’ understanding of the nature of science, especially on the quality of argumentation and meta-cognition (Teixeira et al., 2012). However, even with various approaches, the teachers cannot force students to like physics or be a physicist. One of the alternative ways to deal with this condition is following the interdisciplinary theory that considers students’ individualities, stimulating teachers’ creativity, and focusing on a practice-based education (Radu, 2011).

The personal source is the ideal learning approach, and educators need to highlight its effectiveness in the recent teaching approach. A fully functioning person is manifested in several key traits: openness to experience, awareness, higher self-esteem, exceptional decision-making, good sense of responsibility, non-conformist lifestyle, reliability, and life that encompasses a rich spectrum of emotions (Woodward, 2020). This condition is what teachers want in their class; thus, both students and teachers must collaborate to achieve this ideal condition in the classroom setting.

The ideal condition for learning, which is the Learner-Centered approach, has more positive effects in terms of student outcomes, including the reduced amount of dropouts, higher achievement scores, interpersonal functioning, and decreased rates of personal conflicts among students (Rogers et al., 2013; Woodward, 2020). If the personal source is the approach teachers use in every classroom, students will become capable of doing great things in life and have the courage to explore what they want to learn. The most challenging part of learning physics is when the students encounter a quite challenging problem in understanding some concepts in physics. Will the teacher let this condition happen?

On the other hand, learners need to realize that physics discipline needs more effort to think logically. In many cases, students are required to solve the physics problem using not only one concept but also complex concepts. However, te-

achers need to share the insight that this course is essential for human beings. Thus, physicists discover it with difficulty, human error, and countless experiments. For instance, Newton with classical physics, Einstein with relativity, Hawking with Black Hole Radiation, and other physicists who gain novelty also encounter the same problem as a student in their early ages of learning.

For example, when Einstein established the gravitational shift in the first two decades of the twentieth century, there was much confusion among the prominent physicists, notably over how the gravitational redshift was derived. If the leading physicists could be confused when first confronted with the new theory, the teachers should not be surprised when new students often lead to confusion (Scott, 2015). The difference was the belief (self-efficacy), awareness, and usefulness of what physicists learn. The physicist at that time believed that physics could create a significant contribution to the world and became the reason why they pursued it.

Alternately, the researchers developed several solutions to make the students more engaged in the learning process. Barbara Romain (2010) states that teachers can help the students using three approaches which teachers often neglect. The three concepts are the pygmalion effect, shaping behavior, and self-efficacy. Firstly, shaping behavior (Skinner Behaviorism) is an essential component of positive reinforcement or behavior modification in the classroom (Toates, 2009). Secondly, Bandura's concept of self-efficacy states that students' concepts of themselves will determine their success in the learning task (Bandura et al., 1999). Finally, Rosenthal's Pygmalion effect states that the teachers' messages and expectations determine students' success in learning (Rosenthal, 1973).

As history repeats itself, the learning difficulty of the students is not new to the teachers. When the instructor introduces the new concepts in physics, the students are often confused, same with the leading scientists who are confused about the subject when it was newly discovered (Scott, 2015). At the same time, teachers also have difficulty with the concept when they first learn it. So, understanding students are essential to know and solve the problem. Another solution, teachers shall lead students to the paradox and then help them resolve it (Scott, 2015).

Furthermore, the authors suggest that physics teachers shall use various experimental tools to deliver physics concepts, minimize the use of the traditional method, and promote new technological tools. Nowadays, physicists and physics

educators have created a significant development in physics activities and offer free software in learning, for instance, PhET from Colorado University America or CosCi from National Central University Taiwan. All material from these websites can help students understanding physics not only about equations but also about the actual concept work in the universe. Teachers need to think about the following question when our student does not like physics and does not want to learn. The first thing that teacher needs to know is not everyone wants to become a scientist.

On the one hand, teachers need to give the students a learning pace to choose what they need to learn based on their understanding capacity. Teachers are responsible for imparting the needed knowledge to prepare new generations of scientists to overcome the challenges that may pose a threat to humankind by delivering scientists' messages. By then, students may decide what they want to be. If this condition happens, the students who want to be scientists or physicists will be influenced by positive effects (i.e., attendance, achievement scores, and interpersonal functioning) (Rogers et al., 2013; Woodward, 2020).

On the other hand, for students who do not intend to become physicists, teachers need to teach them the least physics fundamentals necessary for learning based on their learning capacity. Furthermore, the teachers need to realize the interpersonal skill theory that reveals every student has an innate intelligence, as shown in Figure 5. The theory of multiple intelligence by Howard Gardner (2011) states that every student has various types of intelligence wherein the teachers need to consider and understand.

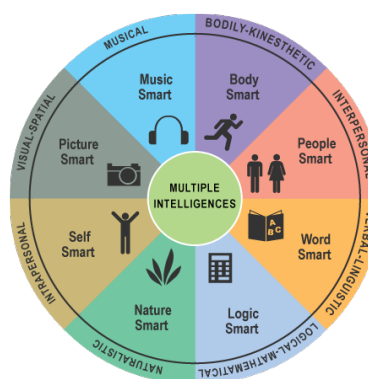


Figure 5. Type of Intelligence

Furthermore, for assessing students in learning physics with different intelligence (Personal Source), teachers may not force them to learn something beyond their grasp; the willingness to learn must start from students. Moreover, teach-

ers need to deal with this condition and prepare the assessment to carry every personal skill. One of the examples is competency-based (CB), developed by Perdue University. The skills are clearly defined and evaluated in the competency-based learning approach. Also, within the instructional process, the fundamental competencies are underlined; it will be more appropriate to teach physics to learners with various disciplinary interests (Rajapaksha & Hirsch, 2017).

The CB approach was regarded as a method to communicate the expected outcomes of learning experiences to learners. Rajapaksha & Hirsch (2017) envisioned that the CB approach had the underlying competencies highlighted within the instructional process. Through this approach, it would effectively teach learners with diverse disciplinary interests and skills. More likely, it was an alternative way of dealing with the interdisciplinary problems of the students.

Experts in education from various countries have also developed many tools to solve physics teaching problems. For instance, students can learn many thinking skills during physics class because it could provide new insights and allow new attitudes for students (Eger, 1972). To fit with interpersonal skills, teachers need to think that learning physics is more important than having a score in the class. However, the score is also an important way to measure students' mastery of a given area of interest.

To deal with the dilemma, teachers need to assess, and students need to learn freely. The teachers need to set the various ways of assessing students' knowledge and skills in the classroom. For example, open-ended questions and Bloom's taxonomy may help teachers provide diversity among learners. To motivate students who show no interest in learning physics, teachers need to give them some related issues about what students like in real life and make a correlation with physics; For example, when students like music, teachers can bring experiment tools in music as a stimulus at the beginning of the class.

Furthermore, at the end of the semester, commonly, teachers conduct examinations among students (e.g., 40 questions) with multiple choice. In addition, teachers are encouraged to ask open-ended questions about the importance of physics in the world and its implications in a real-life context. Open-ended questions are set to uncover the different types of intelligence that the students might possess. They will respond to the particular examination based on the level or kind of intelligence, as mentioned in Figure 5. For example, if a particular student shows a characteristic of having logical-mathematical intelligen-

ce, the context of the writings will be more likely but not limited to quantifying things or making a hypothesis. In addition, if a student demonstrates naturalist intelligence, the learner will associate the answer in understanding living things and nature. Using many examination types, teachers can be aware of the uniqueness of every individual (Zucca-Scott, 2010).

Investigating the level of students' conceptions of physics would be visible in the open-ended questions (Tanahoung et al., 2010). The open-ended questions were also allowed students to exercise greater autonomy in what and how physical phenomena were investigated (Wilcox & Lewandowski, 2016). The difficulty of the topic was not the same as it was not essential, sometimes we had very complex material, such as quantum physics, but it was essential.

In addition, concerning the questions in the examination, teachers are advised to include not only to calculate something in physics but also how to combine these elements of cognitive components (Anderson & Sosniak, 1994). In addition to the cognitive stage, which is the main foundation in physics, the teachers must include the affective component related to students' value. Anderson & Sosniak (1994) has six categories of cognitive skills. In assessing the students, the teachers need to realize that every student cannot reach a higher level. Students may reach the 6th level while others reach the 3rd level; it is not a problem.

Finally, the teaching philosophy statement is beneficial for teachers. TPS is a kind of style in teaching; if teachers do not have style, teachers will not enjoy the process. TPS stands in the higher hierarchy in the classroom and can be flexible based on the condition. For example, we can remediate TPS through technology development (Alexander et al., 2012) or alter it due to the obstacle of learning during COVID-19 (Beatty et al., 2020a). There are no fixed strategies or methods in learning; neither of them is perfect. However, teachers can choose which one is suited for a specific classroom scenario based on the guidance of educational experts. So, the teachers need to use more than one method, learning approach, or even the TPS. In some ways, students have a different mindset, and somehow impossible to understand the behavior; thus, teachers must deal with students' initial condition and keep on the learning process. The concept of learning is constantly changing to set the perfect system. Teachers need to have the courage to set forth and explore the perfect educational system, and everyone can teach better than expected.

CONCLUSION

The teaching philosophy statement is the most common word that researchers use to mention the teacher's incredible vision of teaching in the classroom. The teaching philosophy statement is essential in developing teachers' capabilities. As the facilitator of the learning outcomes, the teachers must possess good character and value-laden attributes necessary for teaching. The definitions of teaching philosophy statement may differ depending on the expert who writes it and its application in the classroom (i.e., philosophy in science teaching, philosophy of physics, philosophy of science in teaching, teaching philosophy, teaching statement, and teaching philosophy statement). However, the teaching philosophy statement is the most common phrase since Beatty et al. explains the concept in the early 21st century. Being a teacher is not about the job; it collaborates between the job and the style. Every teacher has their preference. If teachers can collaborate on these two things in their profession, it will be an excellent career. Being a teacher is a life-long journey of learning; hence, it is important to find the teaching style wherein the teaching philosophy statement must grow and prosper in the classroom. For the TPS in teaching physics, authors perceive it as "let's think about," which is inspired by the philosophy of progressivism from John Dewey that states every student has a different ability and there is no coercion upon the studying physics. The integration of physics and natural science with philosophy has been widely known through the opinions of many experts, such as Duhem, who offers essential suggestions about how physics progresses over time and how physics should be taught.

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