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Technical education teachers' perception of higher-order thinking skills and their ability to implement it in Indonesia

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ABSTRACT

World Economic Forum's report reported that the top five out of 10 skills needed by employers in 2025 are: (1) analytical thinking and innovation, (2) active learning and learning strategies, (3) complex problem solving, (4) critical thinking and analysis, and (5) creativity, originality, and initiative. These skills thrive workers entering the Fourth Industrial Revolution (4IR) and are the core of Higher Order Thinking Skills (HOTS). Parallelly, educationists conclude that teaching students with HOTS is a must, but the challenge is how to do it effectively. This study's objectives were to know vocational and technical teachers' perception of HOTS and their ability to teach HOTS in their classrooms. The study population was State Vocational and Technical Senior High School (SMKN) in Yogyakarta Special Region (DIY) and Central Java Province in Indonesia. The sample was determined by quota technique sampling and came up with SMKN 2 Yogyakarta in Yogyakarta, SMKN 2 Klaten, and SMKN Magelang in Central Java Province, Indonesia. Collecting data technique used closed- and open-questionnaires and documentation. Data analysis used statistical descriptive and qualitative description. Research findings revealed that teachers' perception of HOTS was very positive. At the same time, their ability to integrate HOTS concepts in their lesson plans and to implement them in the classroom still has significant difficulties.

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INTRODUCTION

By 2021, the Fourth Industrial Revolution (4IR) will come to advanced robotics and autonomous transport, artificial intelligence, machine learning, advanced materials, biotechnology, and genomics. According to Gray (2016), these global developments will transform how people work. Some jobs will disappear, others will grow, and jobs that do not exist today will become commonplace. To maintain and thrive in employees' jobs in this era, they must master the ten skills: complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility. Referring to the UNESCO report on what kind of learning for the 21st Century (Scott, 2015) and revised Bloom Taxonomy (Krathwohl, 2002), those ten skills above should be categorized as Higher Order Thinking Skills (HOTS).

The Indonesian Chamber of Commerce and Industry (KADIN) reported relatively low national workforce productivity. Hence, their competencies need to be improved, and one of the main components of the workforce is senior vocational school (SMK) graduates (Republika, 12/12/2013). Then, the Central Bureau of Statistics of the Republic of Indonesia reported that the rate of open unemployment of SMK graduates is the highest among others (Badan Pusat Statistik Republik Indonesia, 2017). Respectively, the unemployment rate for each school level was elementary school-3.54%; junior high school-5.36%; general senior high school-7.03%; vocational senior high school-11.30%; 3-year diploma-6.35%; and university-4.98%.

In response to the issues above, the President of Indonesia enacted President Instruction (Inpres) No. 09 of 2016 About The Revitalization of Vocational Senior High School (SMK) as an effort to raise the quality and competitiveness of human resources. Specifically, this instruction mandates MOEC to "link" and "match" SMK curriculum to the needs of business and industry. As a result, the existing 2013 curriculum was revised, which some people called the "2022 curriculum". This new curriculum was designed to accommodate competencies required by national businesses and industries and by global industries that emphasize HOTS.

Teaching HOTS is considered a new concept and practice for most vocational and technical teachers in Indonesia. Therefore, the mandate for teachers to implement it is a challenging task. MOEC considers integrating HOTS into subject matter teaching as an innovation. Furthermore, national seminars, workshops, training, and in-house training on implementing HOTS have been carried out. In-house training has also been conducted in most vocational schools.

Up to now, there has yet to be any research to describe whether vocational and technical teachers can teach HOTS effectively. Therefore, this study was conducted to describe: (1) vocational and technical teachers' perception of HOTS; (2) vocational and technical teachers' ability to integrate HOTS into their lesson plans; and (3) vocational and technical teachers' ability to implement HOTS in vocational subject matters.

Review of Literature

The concepts and principles of HOTS

A comprehensive definition describes that HOTS is a thinking process that consists of complicated procedures and needs to be based on various skills such as analysis, synthesis, comparison, inference, interpretation, assessment, and inductive and deductive reasoning to be employed to solve unfamiliar problems (Budsankom et al., 2015; Smith & MacGregor, 1992; Sutarto, 2017; Zohar, 2013). Referring to the revised Bloom taxonomy that covers six orders of thinking: remembering, understanding, applying, analyzing, evaluating, and creating process, HOTS focuses on the three upper levels or the last three levels, while the first three are called lower-order thinking skills (LOTS). The description of each order thinking skill of the six orders is illustrated in Figure 1.

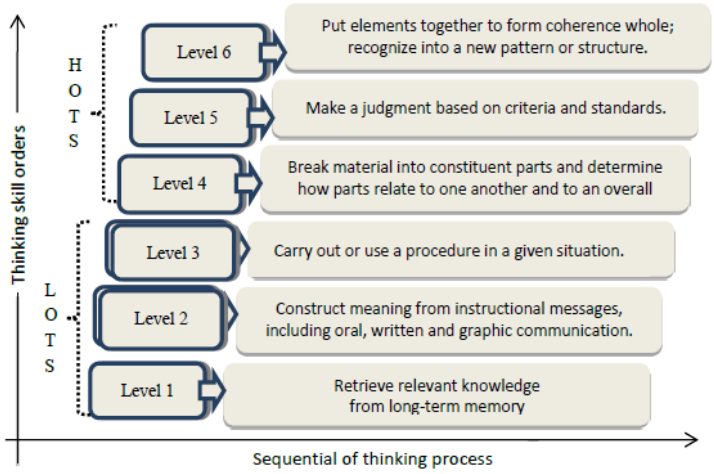

Figure 1. Six Levels of Thinking Skills

HOT is complex and may not be easily defined (Yen & Halili, 2015), however for the sake of clarification in teaching and learning purposes, Yen and Halili (2015) have identified some prominent indicators to differentiate between teaching in HOTS modes and the traditional ones as shown in Table 1.

Table 1. Comparison Between Teaching of HOT and Traditional Teaching

Teaching in HOTS	Traditional Teaching
Not routine/not fully known in advance	Routine/outcome planned in advance
Complex	Clear purpose and goal
Yields multiple solutions/view points	Yields converging outcomes
Involves uncertainty	Seeks certainty
Involves process of making meaning	Involves process of doing
Is effortful, requires mental work	Is judged by outcome rather than effort

Teachers' Perception on New Curriculum

Perception is how someone thinks and feels about a company, product, service, and so on (Woodruff et al., 2018). In this study, teachers' perceptions may be described as how teachers think and feel about the new curriculum. The more positive teachers' perception of a new curriculum, the better impact of curriculum implementation. It is in line with research findings stated by Gordon and Yocke in Onyia et al. (2016) that the teacher is pivotal in any change within the school system.

Duke (2003) also claimed that teachers have increasingly been considered the centerpiece of educational change rather than mere executors of policies enforced on them. According to Charalambous and Philippou (2010), attention has now been given to teachers' characteristics and capacities that could affect curriculum reform implementations. Therefore, relevant to this article, teachers' perception of HOTS should be considered a vital element in its implementation.

The teaching of HOTS is categorized as an educational innovation defined as an idea, practice, or project perceived as new by an individual or other unit of adoption (Eberle & Childress, 2009; Hashim et al., 2015). Rogers et al. (2008) elaborated that the adoption rate of an innovation depends on five characteristics of the innovation: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability.

Rogers et al. (2008) provides a detailed description of those respective five characteristics. Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. In the case of this study, the more advantages teacher perceived by implementing HOTS (e.g., rewards, acknowledgment, and academic status), the earlier and more intensive teachers implement it. Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (p. 15).

Thus, the more consistent the concept and principles of HOTS perceived by the teachers' or schools' values (e.g., personnel teacher's vision, school's vision, and mission), the more enthusiastic teachers implement it. Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use (Rogers et al., 2008). It means that the teachers perceive that the more complex the concept and principles of HOTS, the more reluctant teachers are to integrate HOTS in planning and teaching implementation.

Trialability is the degree to which an innovation may have experimented on a limited basis (Ducharme et al., 2007). It follows that the more practical or easier to integrate HOTS into the lesson plan and its implementation in the classroom, the more passionate teachers are to implement it. Observability is the degree to which the results of an innovation are visible to others (Sanson-Fisher, 2004). It follows that the more visible the positive impact of HOTS implementation in teaching, the more motivated teachers are to adopt its concept and principles in their teaching practices. A colleague teacher who successfully implements HOTS principles in his/her teaching is visible to other teachers. It becomes a role model and observable as a best practice.

Teaching HOTS

According to Thomas and Thorne (2009), exercising HOTS in classroom teaching may seem uneasy. They offer a number of strategies to be selected to enhance the teaching of HOTS, which include:

> *(1) Teaching the concept of concepts and making sure students understand the critical features that define a particular concept and are able to distinguish it from other concepts; (2) Name key concepts to guide students to identify which type(s) of each concept is concrete, abstract, verbal, nonverbal or process; (3) Categorize concepts and guide students to identify important concepts and decide which type of each concept is (concrete, abstract, verbal, nonverbal, or process); (4) Tell and show the concepts because some students need to be "told me" while others need to be "showed me."; (5) Move from the concrete to abstract and back to concrete so that students can state an abstract concept in terms of everyday practical applications, then that person has gotten the concept; (6) Teach steps for learning concepts that include naming the critical (main) features of the concept, name some additional features of the concept, name some false features of the concept, give the best examples or prototypes of the concept (what it is), give some non-examples or non-prototypes (what the concept is not), and identify other similar or connected concepts; and (7) go from basic to sophisticated so that students can master basic concepts before proceeding to more sophisticated concepts* (Thomas & Thorne, 2009).

Another strategy suggested by Thomas and Thorne (2009) to enhance HOTS teaching is actively involving students in metacognitive aspects. Students need to know how they think and learn, which leads them to mental self-management and successful intelligence. It is explained that successful intelligence consists of six components of successful intelligence: (1) know your strengths and weaknesses; (2) capitalize on your strengths and compensate for your weaknesses; (3) defy negative expectations; (4) believe in yourself, called self-efficacy; (5) seek out role models — people from whom you can learn; and (6) seek out an environment where you can make a difference (Thomas & Thorne, 2009).

Callison (1998) stated that HOTS implementation in the teaching-learning process needs to be followed by an authentic assessment type with six main characteristics.

> *First, Constructed Response: Students construct responses to the situation, and multiple new resources are explored to create a product. Second, Higher-Order Thinking Needs: responses are made to open-ended questions and require analysis, evaluation, and creative skills. Third, Authenticity: tasks are meaningful and engaging activities relevant to a real-world context. Four, Integrative: tasks call for a combination of skills and content open to assessment. Fifth, Process and Product: procedures and strategies for deriving potential responses and exploring multiple solutions to complex problems. Six, Depth in Place of Breadth: performance assessments build over time with varied activities to reflect growth, maturity, and depth, leading to mastery of strategies and processes for solving problems in specific areas with the assumption that these skills will transfer to solving other problems* (Callison, 1998).

RESEARCH METHOD

Type of Research

This study is a survey type of research asking sample teachers about their perception of HOTS and their ability to teach it by questionnaire (Driscoll, 2011). In addition, the interview also was administered to have detailed data or opinions that the questionnaire could not fulfill. The interview also functions to crosscheck or even complement survey-collected data.

The Population and Sample

This study population was vocational and technical education teachers in Yogyakarta Special Region and Central Java Province, Indonesia. The sample was taken from vocational and

technical teachers in three piloting schools that have attended national training on the new (revised) curriculum. This assigned sampling technique is classified as a quota sampling technique (Alvi, 2016). The three vocational schools are SMKN 2 Yogyakarta, SMKN 1 Klaten, and SMKN 1 Magelang in Central Java Province, Indonesia. The total number of respondents in the study was all 30 vocational and technical teachers.

Technique of Data Collection

Data collection techniques were questionnaires (closed and open) and documentation. Triangulation of data collection techniques (questionnaire, interview, and documentation) was conducted to ensure the data's reliability and validity, as suggested by Bechhofer and Paterson (2012). There were three questionnaires developed in this study. The first questionnaire was to measure teachers' perception of the concept and principles of HOTS. The second and third questionnaires measured teachers' ability to integrate HOTS principles into their lesson plans and implement those lesson plans. Construct validity and reliability of the three instruments were judged by relevant experts (Kimberlin & Winterstein, 2008). The three instruments' documentation was derived from teachers' lesson plans and analyzed to ensure that teachers' responses to the questionnaire corresponded to their descriptions in their lesson plans.

Analysis Technique

Quantitative data were analyzed by descriptive statistics, while qualitative data were analyzed by descriptive qualitative. To measure the three objectives previously described, it is necessary to perform some statistical calculations, for example, the ideal average and ideal standard deviation based on weighting scores which refer to the normal distribution of curves with six cross-sectional areas. Based on four Likert scales (1, 2, 3, and 4) used in the instruments and referring to Smith M. (2015) describes that Ideal Mean (Mi) = ½ (4+1) = 2.5 and Ideal Standard of Deviation (SDi) = 1/6 (4-1) = 0.5. Table 2 shows categorizing criteria for teachers' competence in authentic assessment.

Table 2. Category of Teacher's Perception on Concept and Principles of HOTS

Criteria	Interval Score	Category
$X \geq (M_i + 1.5\ SD_i)$	$X \geq 3.25$	Strongly agree*3)
$M_i \leq X < (M_i + 1.5\ SD_i)$	$2.50 \leq X < 3.25$	agree*2)
$(M_i - 1.5\ SD_i) \leq X < M_i$	$1.75 \leq X < 2.50$	less agree*1)
$X < (M_i - 1.5\ SD_i)$	$X < 1.75$	Strongly disagree*0)

Notes for Teachers' ability to integrate HOTS in their lesson plan and to implement HOTS in their teaching:
*3) have integrated/implemented the concept and principles of HOTS without difficulty.
*2) have integrated/implemented the concept and principles of HOTS with minor difficulty
*1) have integrated/implemented the concept and principles of HOTS with significant difficulty
*0) have not integrated/implemented at all HOTS in their teaching due to limited ability.

RESULT AND DISCUSSION

Result

Teachers' Perception on Concept and Principles of HOTS

Teachers' perception of the concept and principles of HOTS was measured by 12 items in the first close questionnaire with four Likert scales (4 = strongly agree to 1 = strongly disagree). An open questionnaire cross-checked this perception measure. Data from the close questionnaire was analyzed, and the result is presented in Table 3.

Table 3 shows the score distribution of vocational and technical teachers' perception of HOTS ranks from a minimum score of 3.00 to a maximum score of 3.43 with a mean score of 3.22 on a 1-4 scale or 80.05% level of agreement. Referring to categorizing criteria in Table 2, vocational

and technical teachers' perception of the concept and principles of HOTS is in the category of "agree" (falls between Mi and Mi + 1.5 SDi). It means that the teachers agree that those 12 concepts and principles of HOTS need to be integrated into vocational and technical subjects.

However, the open-questionnaire question: "To what extent do you understand the concept and principles of HOTS?" in the data analysis reveals that more than half (55%) of the teachers do not understand the essential concept and principles of HOTS. Therefore, even though those teachers' perception of HOTS is good, more than half have not yet understood how to implement it.

Table 3. Teachers' Perception on HOTS

No.	Concept and Principles of HOTS	Mean (X)
1	Involves varieties (complex) teaching approaches	3.03
2	Yields multiple solutions/viewpoints of learning outcome	3.10
3	Involves uncertainty teaching and learning process	3.07
4	Emphasizes on process of making meaning than process of doing	3.13
5	Enhance analysing ability in vocational and technical work	3.23
6	Enhance evaluating ability for vocational and technical work	3.30
7	Lead to be creative in work	3.40
8	Develop problem solving skills	3.43
9	Develop inquiry skills	3.30
10	Develop reasoning skills	3.30
11	Develop communicating skills	3.30
12	Develop conceptualizing skills	3.00

Teachers' ability to Integrate HOTS in Their Lesson Plan

This teacher's ability is also measured based on 12 items in the second closed questionnaire with four Likert scales (4 = strongly agree to disagree 1 = strongly). This teacher's ability was triangulated by data analysis of an open questionnaire and document of lesson plans written by the sampled teachers. Data from a close questionnaire was analyzed, and the result is presented in Table 4.

Table 4. Teachers' Ability to integrate HOTS in Their Lesson Plans

No.	Concept and Principles of HOTS	Mean (X)
1	Present variety (complex) of teaching approaches	3.03
2	Provide multiple solutions/viewpoints of learning outcome	3.03
3	Accommodate uncertainty teaching and learning process	2.93
4	Present the process of making meaning than process of doing	3.10
5	Show how to analyse problem in vocational and technical work	3.20
6	Show how to evaluate vocational and technical work	2.90
7	Show how to be creative in working field	3.10
8	Show how to develop problem solving skills	3.03
9	Show how to develop inquiry skills	2.90
10	Show how to develop reasoning skills	2.97
11	Show how to develop communicating skills	3.27
12	Show how to develop conceptualizing skills	3.03

Table 4 shows the score distribution of vocational and technical teachers' ability to integrate HOTS in their lesson plans ranking from a minimum score of 2.90 to a maximum score of 3.27 with a mean score of 3.04 on a 1-4 scale or 76.00% level of integration. Referring to categorizing criteria in Table 2, the vocational and technical teachers' ability to integrate HOTS in their lesson plan falls in the category "have integrated HOTS with minor difficulty" (falls between Mi and Mi + 1.5 SDi). However, data analysis from the open questionnaire question: "To what extent do you integrate HOTS into your subject matters without difficulty?" reveals that only a tiny portion (1.11%) of

teachers have no difficulty integrating HOTS in their lesson plan, the rest (88.89%) have difficulty to do so.

The data analysis from teachers' lesson plan documents reveals that almost all teachers do not integrate HOTS principles in their lesson plans. It can be indicated by the verbs used in teaching objectives written in their lesson plans that (99.30%) represent only lower-order thinking skills (memorizing, understanding, and application), and only two out of 30 lesson plans (0.70%) reflect HOTS implementation. By the triangulation approaches above (closed- and open-ended instruments and documents, it can be inferred that vocational and technical teachers in the study sample did not have adequate ability to integrate HOTS in their lesson plans.

Teachers' ability to implement HOTS

The teachers' ability to implement HOTS in vocational and technical subject matter teaching is measured by 12 items in the third closed questionnaire with four Likert scales (4 = strongly agree to 1 = strongly disagree). This teacher's ability was also triangulated by open questionnaires, interviews, and documents of teachers' lesson plans. Comparable questionnaire data were analyzed; the result is presented in Table 5.

Table 5. Teachers' Ability to Implement HOTS

No.	Implement aspects of HOTS Concept and Principles	Mean (X)
1	Implement variety (complex) of teaching approaches	3.83
2	Accommodate multiple solutions/viewpoints of learning outcome	2.93
3	Show uncertainty teaching and learning process	2.70
4	Demonstrate the process of making meaning than the process of doing	2.82
5	Demonstrate how to analyse problem in the field of work	2.83
6	Demonstrate how to evaluate vocational and technical work	3.08
7	Implement ways to be creative in working field	3.29
8	Implement how to develop problem solving skills	3.08
9	Implement how to develop inquiry skills	3.02
10	Implement how to develop reasoning skills	3.07
11	Implement how to develop communicating skills	3.52
12	Implement how to develop conceptualizing skills	3.19

Table 5 shows the score distribution of vocational and technical teachers' ability to implement HOTS ranking from a minimum score of 2.70 to a maximum score of 3.84 with a mean score of 3.11 on a 4-1 scale or 78.00% level of implementation. Therefore, vocational and technical teachers' ability to implement HOTS in their teaching falls in the category of "have to implement HOTS with minor difficulty" (falls between Mi and Mi + 1.5 SDi). However, data analysis from the open questionnaire question: "To what extent do you implement HOTS into your subject matters teaching," reveals that only a tiny portion (11.11%) of teachers have no difficulty implementing HOTS in their teaching. However, the rest (88.89%) have difficulty doing so.

Data analysis of teachers' lesson plan documents shows that the form has been in line with MOEC's format. It starts with competence standards to be acquired by students, then by learning objectives and teaching-learning activities, and ends with an evaluation. The competence standards have already covered HOTS principles: C4 to C6, curiosity, critical thinking, communication, collaboration, and problem-solving. However, as described earlier, these competencies are not reflected in learning objectives. Most written learning objectives (99.30%) represent only lower-order thinking skills (C1-C3), and only two out of 30 lesson plans (0.70%) reflect principles C4-C6.

In teaching-learning activities, all teachers write scientific approaches in their lesson plans. The scientific approach consists of 5: observing, questioning, collecting data/information, connecting, and communicating. Teachers also write teaching methods about HOTS implementation, especially student assignments, learning discovery, and problem-solving. However, the description of that approach and methods need to be presented. In a more detailed description, only two out of

30 lesson plans (0.07%) describe teaching-learning activities that lead students to be creative, and only one out of 30 lesson plans (0.35%) lead students to the acquisition of inquiry skills.

Regarding assessment, data analysis of teachers' lesson plans reveals that (1) Almost all (90%) assessments written in teachers' lesson plans also represent lower-order thinking skills (C1-C3), and only a small portion (10%) represents higher-order thinking skills (C4-C6); and (2) Almost a half (45%) assessments for skills do not involve performance test that explores multiple solutions to complex problems.

Based on the data analysis above, it can be concluded that the sample vocational and technical teachers have integrated the concept and principles of HOTS in their lesson plans and have implemented HOTS in their teaching with "major" difficulties.

Discussion

Data analysis from a closed questionnaire of teachers' perception of the HOTS concept and principles concludes that the teachers agree that the HOTS concept and principles need to be integrated into vocational and technical subject matter teaching. This finding is supported by other research findings that teaching HOTS is crucial, primarily to guide students' idea generation (Yee et al., 2012). Teaching HOTS is relevant to global economic growth, information and communications technology (ICT) development, a knowledge-based economy, and a fast-paced world (Yen & Halili, 2015). Furthermore, developing students' HOT is complementary to the inculcation of lifelong learning among them and leads students to respond incessantly to real-world demands (Vijayaratnam, 2012).

However, data analysis from the open questionnaire reveals that more than half (55%) of the teachers still need to understand how to integrate them into their teaching. This condition is not ideal yet, but it is a good signal that the teachers are willing to implement HOTS. MOEC needs to respond to this signal intensively to facilitate vocational and technical teachers to fully understand the concept and principles of HOTS and then adopt it in their lesson plan and implement it in their teaching. In this situation, those teachers will seek information to reduce uncertainty about the advantages and disadvantages of implementing HOTS. Referring to Rogers et al. (2008) innovation-decision process theory, MOEC and relevant stakeholders need to empower vocational and technical teachers in five steps towards fully implementing HOTS in their teaching. Knowledge, persuasion, decision, implementation, and confirmation are the five steps.

Furthermore, Rogers et al. (2008) explained those five steps. First, the knowledge step means teachers need to be able to answer at least three questions: (1) what is HOTS, (2) why vocational schools need to teach HOTS, and (3) how teachers teach HOTS to their students. The second persuasion step occurs when teachers have a negative or positive attitude toward HOTS. Colleagues, peers, and close relatives affected the teachers' opinions on HOTS, and trusted friends and colleagues are the most convincing decision-makers.

Third, the decision step refers that teachers' preference to adopt or reject HOTS. Rogers et al. (2008) stated that in paternalistic cultures (which may be suitable in Indonesia), this collective adoption can transform into a personal decision. Fourth, the implementation step means integrating the HOTS concept and principles into lesson plans and implementing them in the classroom. However, uncertainty about the outcomes of HOTS implementation can still be a problem. Thus, the teachers may need technical assistance from MOEC or relevant experts to reduce uncertainty about the consequences.

Fifth, the confirmation stage refers to teachers seeking support for their decision. The implementation step may include discontinuance when HOTS integration in their teaching does not meet the teacher's or school's needs. So, it does not provide a perceived relative advantage, which is the first attribute of innovations described earlier in the rate of HOTS adoption. So, MOEC and the under bow have to facilitate teachers in those five aspects to reap maximal results of teaching HOTS at schools.

Data analysis from the closed questionnaire reveals that the second and third research findings conclude that vocational and technical teachers have integrated the concept and principles of HOTS in their lesson plans and have implemented it in their vocational subject matter teaching with "major" difficulties. These findings were supported by data analysis from opened questionnaire

question, "What are the obstacles in implementing the teaching of HOTS?" the results were 50% due to inadequate HOTS socialization and seminar on HOTS and 50% due to inadequate workshops and in-house training on HOTS.

Most educationists agree that HOTS must be taught to students (Sutarto, 2017; Thomas & Thorne, 2009; Yen & Halili, 2015). However, beyond the teachers, some factors still need to support the implementation of HOTS. Yen and Halili (2015) remind us of the following factors. The first is time constraint. It refers to tight allocation for each subject matter. Teaching HOTS is an internal process that needs to develop continuously for extended periods. When a student faces a problem, he/she needs time to observe, ask a question, interact with, discuss, analyze, and solve the problem, all in a one-time frame. It is a challenging task and becomes a time-consuming effort. Teachers may need help integrating HOTS into their lesson planning and implementing it in traditional classroom settings.

Second is students' motivation. According to McGregor (1966), several students, even the good ones, may fall into the X type of person who works as little as possible, taking the easy way out to complete their tasks both in and out of class. Students need to be more motivated to think harder to achieve higher learning outcomes. The third is the standardized test. It inhibits and contradicts the development of higher-order thinking skills (Zohar, 2013).

Students learning outcome assessments should be directed toward appreciating and meriting higher thinking skills. However, it has become a norm that content goals are prioritized over thinking goals. The inflexibility of a standardized test will always be a constraint to teaching HOT effectively (Zohar, 2013). Fourth is the learning environment. In a traditional classroom, the arrangement, desk, and table are set in rows, and students sit in pairs facing the whiteboard. This environment does not support teaching HOTS, and this remains up to this day. The Fifth is a resource. Teaching HOTS effectively requires more media and facilities, such as internet connection, reference books, and newspapers.

Therefore, HOTS teaching will only be effective if MOEC, especially teachers, shift their paradigm from traditional teacher-centered to student-centered that hold a constructivist view to lead students to become active towards meaning-making in the learning process. In addition, Hashim (2015) suggested that the change in the educational setting, in this case, HOTS, should be considered a process, not an event. Adapting developmental sequence proposed by Tuckman (1965) and Sutarto (2017) compiled five phases by technical teachers in implementing HOTS: announcing, storming, accommodating, norming, and performing, as illustrated in the following Figure 2.

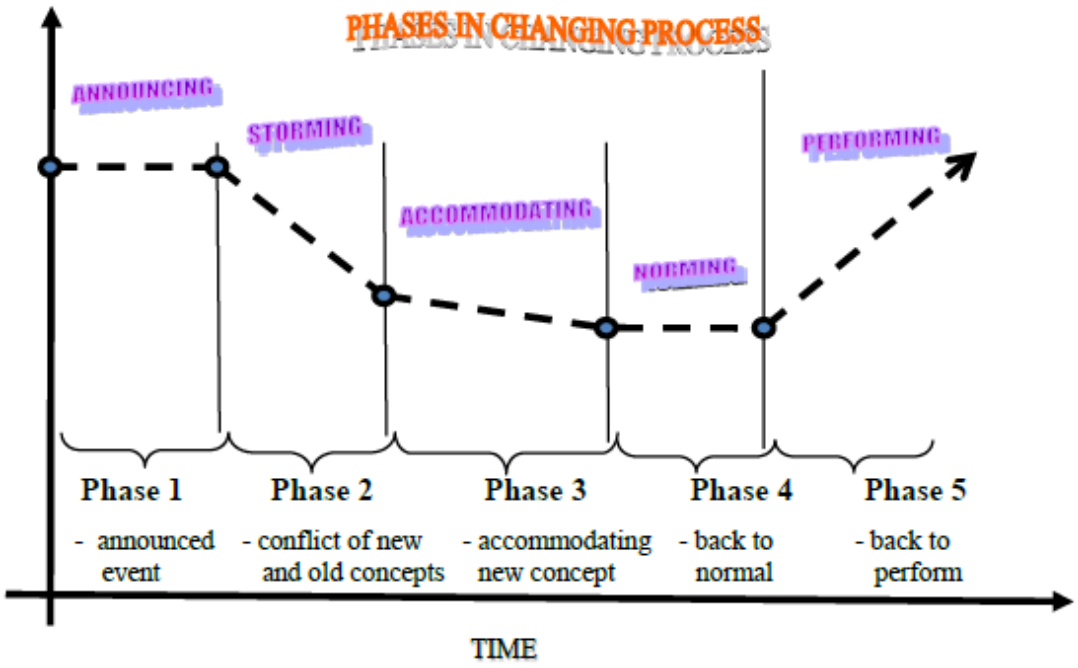

Figure 2. Five Phases in Changes Process

Each phase should be described as the following. Announcing (An) refers to the event that MOEC announced HOTS through implementing a new curriculum (2013 revised curriculum). Storming (S) refers to the phase of conflict between new (required) teaching practices relevant to the concept and principles of HOTS with existing teaching practices based on old concepts and principles of the previous curriculum (school-based Curriculum – KTSP) that have to be left. Accommodating (A) refers to the technical teachers' willingness to learn, understand, and eventually accommodate the new concept and principles of HOTS in their practices. Norming (N) refers to the normal situation in which technical teachers accept and apply the principles of HOTS appropriately with comfort. Performing (P) refers to the phase in which technical teachers can effectively implement teaching HOTS.

The time needed for a phase to be completed and move on to others (for S, A, N, and P) rely on the intensity of teachers' empowerment by MOEC and related stakeholders. The more intensive the teachers' empowerment, the shorter time to move from one phase to another.

CONCLUSION

Vocational and Technical teachers' perception of HOTS in Indonesia was very positive. It was indicated by an 80.05% level of agreement that students need to be equipped with HOTS. However, teachers still have significant difficulties integrating HOTS concepts and principles into their lesson plans and implementing HOTS in their classrooms. MOEC and relevant stakeholders need to acknowledge that HOTS teaching is a process rather than an event. Therefore, they should not target the deadline for HOTS implementation. From the MOEC perspective, support and facilitation should be provided with a focus on teacher empowerment. To speed up the transition process from the current practices towards teaching HOTS successfully, MOEC should provide a template of lesson plans and teaching materials as references. Workshop, in-house training (IHT), sabbatical teaching, and other activities should also be conducted. The number of pilot schools should be assigned as a model for other schools to implement successful HOTS teaching. Curriculum and other related programs at the university level should be reviewed and revised to meet the needs of HOTS teaching at vocational and technical schools.

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