TEACHERS' BELIEFS ON THE IMPLEMENTATION OF ENGLISH AS MEDIUM INSTRUCTION (EMI) IN STEM EDUCATION (A Case Study In an Indonesian Cambridge Standard School)

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ABSTRACT

This research aims to map out teachers' beliefs about, perceptions of, and classroom practices emphasizing English as the medium instruction towards STEM education. This study addresses the following research questions: (1) what are teachers' beliefs on applying English as the medium instruction through STEM subjects in elementary school? (2) How does English as medium instruction impacts STEM subjects for elementary school? (3) What do teachers identify as challenges and barriers to use English as medium instruction in teaching STEM subjects? Moreover, this research determined as the first step to design pre-service teacher to teach STEM disciplines subjects emphasizing English as the medium instruction. A multi-case case study was conducted with two elementary school teachers. These two teachers were purposefully selected from a Cambridge Standard School to represent science, mathematics, and as English teachers as well. Data collection consists of document analysis, classroom observations, and interviews. Triangulation was used to validate the data. Data were analyzed using the constant comparative method. Findings from the case studies are (1) teachers' beliefs influence their professional coursework, classroom practices, and how they perceived future education, (2) as the medium of instruction changes the classroom gets more interactive and students have fun in learning, (3) new vocabularies that students have not known and matched approach were two big barriers for teachers.

Keywords: Teachers' Beliefs, EMI, STEM Education

1. INTRODUCTION

The world is revolving around English language in academic manner. Begin with English being taught as a foreign language (EFL) to English being the medium of instruction (EMI) for teaching academic subjects as science, mathematics, geography and medicine (Dearden, 2014). In a specific case of the Faculty of Teacher Training and Education, in Indonesia, does not prepare pre-service teachers to teach subjects in English

as their communicative language. Most likely they are taught to teach subjects in home language; Bahasa Indonesia. Pertaining to the requirement of 21st century workforce, teaching STEM subjects (i.e. Science, Technology, Engineering, and Mathematics) utilizing English language is essentially needed.

In Indonesia the movement of STEM education itself is rare to find. The STEM education development in developed countries indicates that education in Indonesia needs to rise in order to create inter-disciplinary learning and establishes achievement in science, mathematics, engineering, and technology. It is essential to focus on the teachers as they hold a central role in the success of new improvements. Raising government and teacher to embrace English as medium instruction in STEM education is considered as the implication. (Nugroho, Permanasari, & Firman, 2019)

Dickstein (2010); Engelbret (2015); state that STEM skills are important as English Language for the future workforce which represent strong demographic and the state of being multilingual where language is needed to communicate in an academic manner. Language is needed for students to explain their world, giving opinions, record their observations, and the way they delivered the results to audience. While science offers meaningful context and language provides practice communication, as a result they are balance each other naturally. To engage English proficiency in academic content, teacher needs to develop English Language Teaching skills. This is in line with Pahrudin, Triyana, Oktarisa, & Anwar, (2019) that the goal of nations in the face of the industrial revolution 4.0, which is to prepare qualified science graduates who can compete globally.

Mutakinati, Anwari, & Yoshisuke, (2018) portray that the essential role on STEM education is getting realized by government, academia, society, and industry. Furthermore, there is an urgent need to address the teacher points of view on the STEM education. Surprisingly, the implementations of STEM education in Indonesia have not been critically examined and moderately little attention given to it. Therefore, in order to promote STEM education, this present study seeks to obtain data which will help to address these research gaps on STEM education in Indonesia regarding on the implementation of EMI within the context of teaching learning process. It is hoped that the insights obtained from this study on teachers' beliefs can contribute to design pre-service teachers to teach STEM education which may enhance beliefs that are reassuring to the teaching approaches reflected in the national curriculum.

1.1. STEM Education

STEM had its origins in the 1990s at the National Science Foundation (NSF) and has been used as a common label for any event, policy, program, or practice that implicates one or several of the STEM disciplines. The current term STEM is used to emphasize an understanding of the integrated disciplines of science, technology, engineering, and mathematics education. The reauthorization of the Elementary and Secondary Education Act (ESEA) could emphasize the prominence of science, and by their close connotation, technology and engineering in school programs. STEM is usually understood to mean science or math and seldom does it pertain to technology or engineering. (Bybee, 2020).

Research on STEM education increase gradually and shows its essential literature because of the relevant requirement skills in 21st century. In many countries STEM education is promoted to prepare their citizen to recognize STEM and have various abilities to use in the future. STEM education has been recognized in the U.S as a crucial educational improvement and designated as an instructional approach to prepare children for the century's global economy.

Result from the 2011 Trends in TIMSS (International Mathematics and Science Study) in mathematics revealed that fourth graders in the U.S ranked 11th and eight graders ranked 9th compared to other nations which is arising the idea of developing STEM learning models. Education system in Indonesia is still over shaded with chaotic purpose of the curriculum for basic education, yet the existing research revealed that science and math teachers are lacking in educational knowledge and efficacy in STEM education. (Nugroho et al., 2019)

1.2. CBI, CLIL and EMI

Content-Based Instruction (CBI) refers to an approach to second/foreign language teaching in which teaching is systematized around content or information rather than around forms, functions, situations or skills. This focus on content knowledge, however, does not require a sacrifice of linguistic skills. In paradox, CBI denotes a dual commitment to language and content-learning objectives (Herrero, 2005). Since CBI is an integrated, holistic approach, students are exposed to all skills and are required to synthesize from multiple sources (Brinton, 2013). In CBI approach, the taught skills aid students' professional knowledge and prompt them to take part in interactive activities in class (e.g. foreign language) (Thi et al., 2011).

CLIL integrates both Content Learning and Language Learning. Using CLIL, students learn one or more of their school subjects in a targeted language. Students are not expected to be proficient in the new language before they begin studying rather they need for studying at the same time as they learn the subject (Montalto, Walter, Theodorou, & Chrysanthou, 2014). Implying on that, language teachers require to learn more about subject content and subject teachers require to learn about the language needed for their subjects (Lesca, 2012). Briefly, (Šulistová, 2015) states that CLIL method employs the language to badge on the knowledge from a different (usually non-linguistic) subject.

From the existing report of the use of EMI around the world in 55 countries, Indonesia is taking part in the list where EMI is established (Dearden, 2014). The dissolute development of technology and digital communication as the result of organization is become one of the aspects why EMI is becoming a global tendency in English education setting. In Indonesia, while the nation perceives English language as a language of intelligence and high social status makes the country furthering the language-in-education policies. (Khasbani, 2019)

The official policies and statements for introducing EMI states: "A school/madrasah which fulfills all the National Standards for Education and which is further enriched by taking into consideration the education standards of one member nation of the Organization for Economic Co-operation and Development (OECD) and/or another advanced nation which has particular strengths in education such that it achieves competitive advantage in the international forum". In a nutshell, this official statements show that relating EMI had been made publically available. It means that policy makers considering EMI as a way of rapidly mechanism for internationalizing education offer mobility, creating opportunities for students to join a global academic and business community. Indonesia's Education Law Number 20 of 2003, article 50, states that the central or regional governments establish one 'International Standard School' (ISS) at all levels, primary, junior, secondary and senior secondary. EMI was mostly used for core subjects such as science and mathematics. (Dearden, 2014).

EMI is used in some countries such as Hong Kong, Malaysia, and Pakistan. While sometimes in Hong Kong, EMI used as synonymous with CLIL; taken value where EMI simply describes the practice of teaching an academic subject in English where it is not the first language for the population majority. Besides, Malaysian policy states: "Malaysia's

multicultural society makes it a natural environment for producing students who are proficient in more than one language". (Dearden, 2014).

Where English as a medium instruction to be used to perform academic tasks that requiring numerous classroom-related communicative activities such as gaining information through listening and reading and conveying information through speaking and writing is quite ensuring in providing students and teachers more exposure to the language acquisition. There are some opportunities supporting the implementation of EMI: 1) The fact that bilingualism gives cognitive advantages, 2) The fact that the important role of English would motivate students and teachers to learn the language, 3) The fact that EMI would give students and teachers more exposure to English and more chances to acquire it, and 4) The fact that literacy skills and strategies acquired in a learner's native language, Indonesian, transfer to her/his second language, English. (Ibrahim, 2001).

Ibrahim, (2001) distinguished the dimensions that can be considered in implementing EMI: 1) *Participants;* students and teachers play crucial role where the effectiveness of teaching and learning process depend on them, thus, both groups need to be linguistically prepared. 2) *Scope of Use (courses, language skills, and tasks);* the scope can be divided in three components, namely courses, language skill and tasks. At the initial stage, EMI programs do not have to embrace all the school subjects. Some subjects are more easily delivered or communicated in a particular language. Such as "Locally-based" and "culture-specific" subjects (like history, geography, social sciences, etc.) and "reflective" or "creative" subjects (like philosophy, literature, and art) may be best in their original form, Indonesian, while subjects that often considered "universal" (like mathematics and natural sciences) or "international" (like engineering, business, accounting, etc.) can be taught in English.

At the beginning stage, EMI classes may not need to cover all language skills. The teachers can start to teach the students with receptive skill (listening and reading) and gradually move to productive skill (speaking and writing). Lastly, tasks; by relating students' knowledge, experiences and taking advantage of their sense. 3) *Settings (classroom & semester level)*; considering the important semester level to have a successful EMI program, it is the job for policy makers to avoid in forcing low-semester students for EMI; instead, EMI classes should gradually increase with their semester level.

1.3. Teachers' Beliefs

Teachers' beliefs have been a fascinating topic due to the input they offer for the improvement of English language teaching and learning. It has a deep impact on classroom principles because of the types of decisions they embrace and as a representation of their beliefs about language teaching and learning (Gilakjani & Sabouri, 2017b). Teachers' beliefs play important role in theorizing and portraying how the teaching is going to be delivered (Ilmiah & Wafa, 2016). From the viewpoint of education policy, teachers' beliefs are more relatable to look at the impact on teachers' beliefs, practices and attitudes of professional background which can have different causative interpretations (OECD, 2009). There is a connection between teacher beliefs and knowledge to their teaching practices. Thus, it is crucial to arrange a change of teachers' beliefs in order to influence their classroom practice (Belbase, 2019). Teachers' beliefs are extremely needed in order to have deeper understanding on difficulty of teaching learning issues and build up better education programs (Gilakjani & Sabouri, 2017b).

Defining the conceptual history in teacher beliefs is relatively various. (Borg, 2010; Borg, 2019) defines teachers' beliefs as *"teacher cognition"* where it is pertaining in teachers' *"know, believe, and think"*. He further explains teacher cognition studies are examining what second and foreign language teachers' period of their careers, think, know, or believe; related to various aspects of their work between cognitions and actual classroom practices (both pre-active and interactive decision-making). Conversely, Farrell & Bennis, (2013) state that not many teachers are well aware of their beliefs and to what degree whether those are reflected in their classroom practices. In the same vein, Kagan (2010) explains that teacher beliefs is considered as a broadly tacit, intuitively alleged perceptions about students, classroom, and the academic material to be taught. She further portrays that teaching is identic with creative invention of a person and professional growth is an intensely private affair.

Johnson, (1994); Farrel, (1996) state that beliefs are not easy to define or study, therefore, educational research on teachers' beliefs share three basic assumptions. These assumptions are (1) Teachers' beliefs influence perception and judgment. (2) Teachers' beliefs play a role in how information on teaching is translated into classroom practices. (3) Understanding teachers' beliefs is essential to improving teaching practices and teacher education programs.

Based on the above discussion, there are several points to highlight in defining beliefs. Concerning to Borg, (2019) beliefs as parts of teacher cognition include teacher knowledge and personal opinion, which mean that teacher beliefs are assortments of knowledge, views, and personal theories that conceptualizing their work that grow within teachers' mind and they pertain as true.

1.4. Research Questions

This multi-case study describes teachers' beliefs in applying English as medium instruction through STEM subjects for elementary school, reveal the impacts of English as medium instruction in STEM subjects, and to find out the challenges and barriers in using English language as medium instruction in teaching STEM subjects in their classroom.

The research questions that guide this study are as follows:

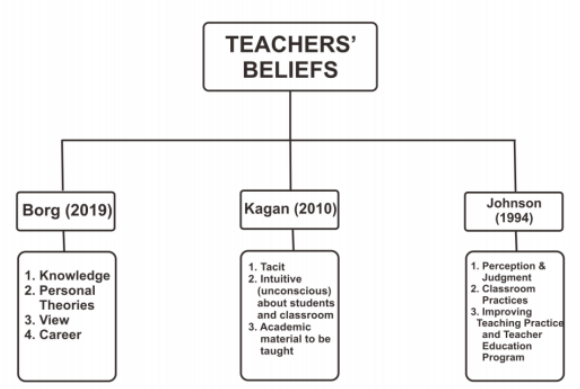
1) What are teachers' beliefs on applying English as medium instruction through STEM subjects for elementary school?
2) How does English as medium instruction impacts STEM subjects in elementary school?
3) What do teachers identify as challenges and barriers to use English as medium instruction in teaching STEM subjects?

1.5. Theoretical Framework

In conducting a research, theoretical framework is an output from literature review. It is a conceptual model on how the researcher theorizes the connection between the variables and the identified problems which is considered important. Grant & Osanloo, (2014) state that theoretical framework is one of the most essential aspects in the research process as the "blueprint" or guide.

The path of a research explained by the theoretical and conceptual framework and grounds it firmly in theoretical constructs. Serving the research findings in more meaningful, conventional to the theoretical constructs in the research fields, and confirms the generalizability is the overall aim of the two frameworks (Adom, Hussein, & Joe, 2018). Accordance with Grant & Osanloo, (2014) the chosen framework by the researcher in his/her work is not subjective but echoes important 21 personal beliefs and understandings about the nature of knowledge, how it presents (in the hypothetical sense) in relation to the observer, and the possible roles to be carried out, and tools to be engaged consequently. The theoretical framework of this multiple-case study is represented as follow:

Figure 1 Theoretical Framework Based the Definition from (Simon Borg, 2019); (Kagan, 2010) & (Johnson, 1994)



2. RESEARCH METHOD (Times New Roman 12pt, Bold, Capitalized)

This research employed qualitative research design with two teachers (majoring in Science and Mathematics) in investigating their beliefs in teaching STEM subjects utilizing English language as the medium instruction. A multi-case study was chosen because of the nature of the research problem and the questions that being asked. It is stand the best plan for answering such questions where its strengths transcend its boundaries. Hence, case study plays crucial role in enhancing a field's knowledge base that will aid structure future research. (Merriam, 2009) Johnson & Christensen, (2017) declare that a research study is conducted in an attempt to solve a problem. In accordance with that 27 Creswell, 2012 states qualitative research design is a research that aimed to discourse problems where the variables are not identified yet and need to be explored more. He added that it approach intends to understand and interpret social communications among sample; for that reason, a small number of respondents are carefully chosen to achieve the richest data.

2.1. Participants

Two teachers were purposely selected to ensure in obtaining the richest data and maximum variation (Alshareef et al., 2018). These two teachers taught subjects that represented different individual STEM disciplines; Mathematics teacher and Science teacher.

All participants filled in consent forms and were reassured that the data would be analyzed and reported anonymously. In this study the researcher used pseudonyms and confidential to protect the anonymity of the participants. (McKay, 2006)

Table.1

Teachers' demographic Information

Teacher	BT21	BT22
Subject	Mathematics	Science
Grade	3rd & 6th	3rd
Teaching experience	2,5 years	5 years
Licensure(s)	1. Elementary 2. Math 3. English	1. Elementary 2. Science 3. English

2.2. Data Sources

In order to facilitate the triangulation process for conducting this multi-case teacher case study, the data collected included: 1) classroom observations during the teaching learning process, 2) a standardized open-ended interview about teachers' perceptions of and beliefs about EMI and STEM, and 3) documentation.

2.3. Classroom Observations

The first step in collecting data is done by observation. (Merriam, 2009) implies that observations and interviews are a primary source of data in qualitative research. Observation is a research tool when it is systematic, when it addresses a specific research question, and when it is subject to the checks and balances in producing trustworthy results. The researcher observed on July 4th 2020 until September 10th 2020 in two different classrooms; Antartica (class's name) and 6th grade. There are about 50 students with vary of background and characteristics. The researcher observed science teacher and math teacher both in national class and Cambridge based class.

2.4. Document Analysis

In document analysis, teachers in this study were observed through their full unit lesson plans for their EMI integration as a part of the classroom practice. These plans were analyzed to understand their unit, verify observation findings, and to look for evidence of teacher beliefs in their classroom practice.

2.5. Teacher Interview

Standardized open-ended interview was employed in this study because of its characters that the exact wording and sequence of questions are determined in advance in a completely open-ended format, provides data based on the participants' beliefs and their actual words, and all the participants are asked the same basic questions in the same order (R. B. Johnson & Christensen, 2017). Furthermore, the researcher wants to know specific information which can be associated and differentiated with gained information in other interviews and either the researcher wants the interview to remain flexible so that the essential information can still ascend (Dawson, 2007).

2.6. Data Analysis

To fully understand the cases, both classroom observations and interviews data were read and examined carefully several times in order to provide deep understanding of the cases. The findings of this study is decided based on the framework that being used in this study. First, the constant-comparative method was utilized to identify the main themes. After identifying the themes, a number of categories emerged and eventually formed the themes and results.

The following is an example of how the data were analyzed:

Data:

"Because Cambridge material is from abroad thus it has to be taught in English. The reason why I want to teach is because I graduated from educational major so it means that I have to be a teacher, right?"

Criteria from the Data:

2.6.1. Open coding of description (analysis activities): naturally, personal experience/background, beliefs/cognition, and who I am.

2.6.2. Aim: personal experience/background and beliefs.

2.6.3. Question: personal experience /background may contribute to the implementing EMI in STEM subjects.

2.6.4. Result: because the interviewee has personal experience/ background highly relevant to educational matter, EMI integration to this interviewee is: 1) naturally, 2) their professional coursework, and 3) obligated.

After identifying the open codes and results from each case, the cross comparison was used to dissect and array the evidence across the cases to generalize teachers' beliefs

about EMI. For example, an open code, there is no challenge, occurred for all two teachers. The following are excerpts from their interviews in which the code was present:

BT21: The way we teach is the style from every teacher and English is not affecting anything, it is just language that being used to have a communication and there is no particular challenge in teaching using English as the instructional activities.

BT22: There is no difficulty due the students already taught in English since they were in kindergarten thus as for the use of English there is no challenge in teaching learning process.

Therefore, a generalization that came from the open coding activity was that all teachers believed that there is no barrier in using English in their classroom practice.

3. RESULTS AND ANALYSIS (Times New Roman 12pt, Bold, Capitalized)

The findings of this research is based on the framework that being used as the lens in analyzing the data.

3.1. Teachers' Beliefs on Applying English as Medium Instruction through STEM Subjects for Elementary School Level

As what BT21 stated, he believed that English for teaching actually is not about the language but rather to the approach, and using English makes the learning easier. When he was asked to talk about the nature of English in teaching, he said, "Because Cambridge material is from abroad thus it has to be taught in English. The reason why I want to teach is because I graduated from educational major so it means that I have to be a teacher, right?" To him, his professional coursework affects his existing cognitions, especially when he acknowledges the important of his scheme. His beliefs also embracing his classroom practices and defines his early connections and shapes perceptions of initial training. 46 Thus, his professional coursework influences his classroom practice. His beliefs are strengthen by the method he teaches his students during the teaching-learning process, he beliefs when students already get their scheme, the actual concept from their experience, it makes the learning easier. This is in line with Gilakjani & Sabouri (2017) where teaching English has a big influence on their classroom principles as they embrace decisions and as their representation of beliefs about language teaching and learning. In accordance with that, BT22 believed that using English in teaching-learning process does not have particular challenge. She further explained that utilizing English influences her

teaching method which makes it faster; compare to her regular class which using Bahasa. She said, "The difference between National Plus (Cambridge) with the Regular Class (that being taught in Bahasa) is because the different structure, if the students are new with the words that little bit hard, maybe because when they have communication in their home they are using slang words, so when they switch to the regular words in Bahasa they have difficult time to understand. But when I teach at Cambridge class the students are very interactive because they are more comfortable using it and they know more vocabularies, maybe because since the beginning they were taught like that from home, so they are feel at ease with it." She also indicates that her previous skills and year's long experience in teaching become reason she believed using English as instructional activities in teaching 47 could make the learning process faster. Her beliefs matched her classroom practice. This is in conformity with Ilmiah & Wafa (2016) that their beliefs taking a part in theorizing and portraying how they teach.

Based on the interpretation above, the researcher highlighting the similarities within this framework which grounded in an analysis of educational research as Borg (2019) states that teacher cognitions and behaviors are mutual with contextual practice, it influences in deciding what teachers' degree are able to carry out instruction in accordance with their cognition. The evidence of that case based on the finding of this study is teachers' experience as learners inform knowledge of teaching and learning that continues to affect throughout their careers. There is also evidence to indicate that their professional training does shape their cognitions. All two teachers were agreed that their previous coursework and experience is leading them for being a teacher and has no doubt in utilizing English as their medium instruction.

3.2. The Impacts of English as the Medium Instruction in STEM Subjects

In these two teachers' cases, their perception of implementing English as their medium instruction strongly influenced how they designed their STEM integration unit. These included perceptions about the process of how to teach a STEM integration unit, and beliefs about how implementing English can improve their students' learning. It is interesting to note that the two teachers who teach different subjects have similar perceptions about implementing English, and this led to different emphases in their STEM lesson units. To BT21, he believed implementing English and STEM based on students' daily life helped them get clearer concept and make their learning easier. He stated "When I am teaching I definitely take the actual examples where students experiencing it so they

get the clear concept not only the theory, because theory without practice will causing problem for students. Surely that will be easier because students already get the concept from there. They know something like why the sun rises from the East; it makes students learn the subject easier. If the students already know the actual concept, later when it appears in learning process it will be easier." His classroom practice confirmed his beliefs. He persistently tried to discover ways to add more mathematics and science content knowledge into his lesson plan. Likewise BT22, she believed the learning process become more interactive and faster. Since she teaches two different classes where the language instructions are in English and Bahasa, she felt that using English make the teaching-learning process become faster. During interview she stated "When classroom interaction changes (from Bahasa to English since she teaches two classes); the class become very interactive because the students are more comfortable using it (English) and they know more vocabularies, maybe because since the beginning they were taught like that from home, so they feel at ease with it." She gave an example – one of her classroom practice was having a case study where the students find out the solutions by themselves, and another one was giving them real experiment. She felt she needed better approach to integrate content knowledge in her lesson unit and to reach out students to engage them interested in learning. Her classroom practice confirmed her beliefs. On the contrary where Farrell & Bennis (2013) state not many teachers are well aware of their beliefs and to what degree they reflected in their classroom practices, however both teachers are well aware of this case. Starting from this point, it can be viewed that both teachers' awareness is the new findings from this study. It stated from BT22 that she felt to use better approach to integrate content knowledge in her lesson unit. Moreover, in BT21 case it also cleared that persistently tried to discover ways to add more mathematics and science content knowledge into his lesson plan.

3.3. The Challenges and Barrier from Teacher as They Use English as the Medium Instruction in Teaching STEM Subject

The two teachers had similar difficulties when they implement English in STEM. New words and approach were two biggest barriers for all two teachers. They think approach alignment would be really helpful for them to see a whole practice in their teaching to engage students' interest in learning the STEM subjects. Thus, as what Gilakjani & Sabouri (2017) their beliefs are needed to have deeper understanding the difficulties on the issues of teaching learning to build up better education.

"…sometimes if the students are new with the words that little bit e…maybe because when they have communication in their home they are using slang words, so when they switch to the regular words in Bahasa they have difficult time to understand." (BT22)

"When in English the implementation of STEM will be a little bit difficult because the students don't know the exact term in math like for, rise, share, and divide." (BT21)

"…as for English we invite teacher from outside where they are expert on the subject matter and as for math as well. e…maybe it is more likely to the approach." (BT22)

"When we use English for teaching actually it is not about the language but rather to the approach. If the approach from a teacher is not fun, it is not interactive, so e….the students don't want to follow. So, the problem is not the language but the approach." (BT21)

During the interview, BT21 stated, "When teachers and students are having the same capability in English actually there is no circumstance on it." Therefore, he emphasized English is not actually a barrier when it only occurs as a language for communication. His beliefs matched his classroom practice. In his lesson, when students get a task in making a diagram, he indicated that mathematics is a very important tool where the ability in calculation to make a diagram is from mathematics subject, and analytical analysis from science. That was another reason he believed STEM integration could increase his students' ability in learning mathematics but did not help him to teach his subject in a more English as a medium instruction in an effective way.

They all believed that implementing EMI and STEM integration increases students' interest in learning more about STEM disciplines 51 because their students have fun and the classroom is very interactive when they apply English as the medium instruction in learning STEM disciplines in their classroom. Consequently, as BT22 beliefs, STEM disciplines give more consideration for students to entering STEM fields as their future career. She is aware that teachers need to prepare the students to compete globally. This is in line with Rapid Review of Curriculum 2013 (2017) that students' capabilities in build and apply both discipline knowledge and understanding the 21st century skills requirement need to be improved.

4. CONCLUSION

The findings of this research are based on the framework from Borg which teacher beliefs can be interchangeable with teacher cognition. According to Borg (2019) their beliefs are embracing teachers' schooling, their professional coursework, contextual factors, and classroom practice. The findings of this research confirm that: 1) Teachers' beliefs influence their professional coursework, classroom practices and how they perceived future education. As teacher they are aware to prepare future generation to get prepared by now. Thus, their classroom experience influences their cognition consciously about the future through their reflection. Both teachers belief that teaching emphasizing English as the medium instruction in applying STEM disciplines has no challenges at all, rather it encourages students to interest more in learning and feels more comfortable using English; 2) As the medium of instruction changes the classroom gets more interactive and students have fun in learning. All two teachers gave very positive feedback about how EMI integration in applying STEM subjects boosts' students' confidence level in learning mathematics and science; 3) The two biggest barriers for both of them were new words that students have not known and how to fit the approach in interactive way to give students great experience in learning. B. Suggestion Based on the research findings and discussion, the findings of this study is considered as the first step for the future research to design pre-service teachers to teach STEM disciplines subject using English as their medium instruction.

This study provided a snapshot of one school and three teachers. Based on the research findings and discussion, the findings of this study is considered as the first step for the future research to design pre-service teachers to teach STEM disciplines subject using English as their medium instruction.

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