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Mathematics Secondary School Teacher Readiness in Applying Heutagogical Approach for Teaching and Learning

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Abstract

By the 21st century, the education system needs to provide its citizens not only knowledge but also a wide range of skills in facing the challenges of globalization and future career preparation. Today, there are various new pedagogical concepts emerging in addressing educational issues such as heutagogy. A heutagogical approach is an approach that encourages students to acquire their own knowledge. This concept paper aims to identify the readiness of mathematics secondary school teachers using heutagogical approaches in teaching and learning. In line with the main objective of the Malaysia Education Development Plan (PPPM) 2013-2025, a competent teacher is a teacher who can provide effective teaching and learning to his students. Thus, based on the analysis, the teacher's readiness in terms of knowledge, attitudes and behaviors identified as domains that should be given attention by mathematics school teachers in implementing the heutagogical approach. Instead of using chalk and talk, mathematics teacher might use heutagogical approach to variate their style of teaching. Thus, as a future research, the pattern of secondary school teacher readiness in applying heutagogical approach for teaching and learning should be explore to see how far the implementation in our school system.

Keywords: Teacher Readiness, Heutagogical Approach, Mathematics Secondary School Teacher

Introduction

The main concern in transformation of the Malaysia education system is to enhance the quality of education. In order to achieve that goal, teachers are regarded as the main resource. Highly motivated and always be ready before entering the class teacher will give a huge impact towards student performance. However, the landscape of learning after the pandemic Covid-19 has changed. It's not enough to just be a highly motivated teacher, but teacher need to be creative and innovative to attract our future generation. Along with that, new studies found out that there are potential issues and challenges faced by teachers such as the use of

technology, online learning, big data and teaching approach from pedagogy to andragogy and next heutagogy (Flanigan & Kiewra, 2017)

The use of technology that continues to increase among both in the classroom and virtually brings a variety of possible issues among educators. For example, learning in class by using a high-tech or low-tech instruments, student attitudes that create distractions resulting in a lack of attention to the process of learning (Flanigan & Kiewra, 2017; Harper, 2018), and differences in unlike learning methods mainly involving the use of technology between the baby boomer generation, generation Z up to the alpha generation (Engelbrecht et. al, 2020). The question is whether the current teacher's teaching approach is still relevant to be practiced by the current generation of students.

Teachers play an important role in preparing themselves to ensure that teaching and learning move in tandem with technological advances despite all the educational challenges. At the same time, they need to deal with academic risks such as lack of support, empathy and teamwork. Thus, self-determination learning through an adequate heutagogical approach helps in inspiring teachers to keep trying. Through this approach, teachers have the opportunity to learn from each other while develop their professionalism and expanding their perspectives for education (Chacko, 2018). Self-determination learning is described as a heutagogical effort to develop skills and expertise, in addition to increasing teachers' self-awareness to teach and learn how to learn (Moore, 2020). This method is effective for involving mathematics teachers in re-evaluating teaching methods and improving teachers' knowledge exploration skills. Heutagogical approach benefits students by giving them autonomy in deciding and selecting learning methods that best suit their preferences, as well as the appropriate assessment to measure their understanding. It also can increase students' motivation to learn mathematics because they have a clear goal in mind when they begin, especially when students are given the freedom to learn in their own way.

Based on the issues and challenges stated, the current pedagogical approach needs to have proper planning and can be renewed. Effective teaching and learning sessions can be conducted with various methods, especially with the current generation of students. Mathematics teachers should be concerned about the forms of motivation that have the potential to improve student's ability in line with 21st-century mathematics learning. Therefore, in order to attain good performance in teaching and learning, teachers need to develop themselves first.

Literature Review

Heutagogy has mostly been explained in the context of adult education had an impact on the world of education in several areas. Heutagogy can benefit teachers because it is a more open and acceptable approach to 21st-century learning in the context of adding value and competence among teachers. By adopting the heutagogical approach, teachers become motivated to explore the subject they teach. Initially, the idea of a heutagogical approach arose because of growing dissatisfaction with the traditional and conservative approach to education prevalent in educational institutions. This idea also arises when there is a need to recognize learning as a dynamic experience that occurs in teaching that is not linear and always changing as well as complex and influenced by the learning environment (Blaschke & Hase, 2015). In addition, Eachempati et.al (2017) stated that the conventional education approach faces difficulties in preparing students to compete for jobs. The current education system that uses linear methods is not compatible with the existence of a non-linear

workplace environment. Heutagogy is useful for students in the post-Covid-19 era because they are used to the use of technology and unconventional learning methods.

Continuous learning and assessment methods for students should be measured in a structured manner by assessing their level of experience and ability. Heutagogy is an extension of the pedagogy and andragogy approach (Jones et.al., 2019). Through the heutagogical approach, the teacher needs to recognize the student's personality and level, be prepared to let go of the teacher's influence, and then negotiate new learning and assessment methods based on the student's direction based on the learning objectives. In addition, students need to develop the ability and skills in learning self-determination by using the heutagogical approach. Competence can also be referred to as the core ability required to fulfill one's role as a teacher. The competence characteristics of mathematics teachers who use the heutagogic approach are such as self-efficacy, teamwork, collaborative ability, communication skills, creativity, and positive values in themselves.

Hase and Kenyon (2013) suggest heutagogy is suitable for learning in the 21st century as it emphasizes the development of capabilities. Heutagogy uses personal experience to develop abilities. One of the principles in heutagogy is the shift of control from the teacher to the student (Blaschke, 2012), where the student acts as an agent of their own learning (Snowden & Halsall, 2016). Students will decide on learning objectives based on their needs and interests without a teacher telling them what to do. In order to encourage students in achieving learning objectives, students are also allowed to design their own learning strategies (Wehmeyer et al., 2016). Self-directed learning can increase student engagement in learning because there is freedom to manage behavior by increasing instruction, monitoring, and evaluation (Wehmeyer et al., 2016).

Heutagogy is important for the implementation of 21st century learning in developing individual capabilities (Chan et.al., 2019). Gillaspay and Vasilica (2021) emphasize that the heutagogical approach increases digital use among students and prepares them to get jobs easily in the future. As a result, Handayani et. al (2021) states in his reference that the heutagogical approach has been applied in the Indonesian "Teacher Professional Education" (TPE) model to improve teacher competence. However, the results of Suhaimi's study (2020) found that there are no more proper heutagogy criteria that can be used as a guide in planning to teach and learning through a literature review.

This indicates the need a need to understand the readiness of mathematics teachers in implementing the heutagogical approach in teaching and learning. The term heutagogy is referred to as self-determined learning which is an educational approach that emphasizes self-determination by students (Blaschke, 2012). This means that learning occurs when students are ready to learn, and not when the teacher expects or intends to do so. Learning using this approach can take place in the classroom or even virtually. Heutagogy does not set a learning time where it provides opportunities for students to be more versatile and encourages them to interact in their learning. The main advantage of this flexibility is how different learning methods can be used in the same teaching and learning session (Moore, 2020). The concept paper aims to explain the need for the readiness of mathematics teachers in implementing the heutagogical approach in teaching and learning. The level of readiness of mathematics teachers is seen from the aspects of knowledge, attitude and behavior.

Term Definition

Mok (2008) defines readiness as the ability of an individual to prepare himself to start a teaching activity. Readiness is a form of process that involves the integration of physical,

mental, and emotional (psychological) aspects of a person in performing an action. Kamus Dewan (2007) also states that readiness is the quality or state of being prepared to do something. There are three types of readiness that exist, namely (a) Physical readiness which includes human aspects in terms of behavior and actions, surrounding conditions (b) Mental readiness which refers to the ability to focus, set goals, the willingness and maturity to think critically and creatively in solving something the problem of not following lust alone and last but not least is emotional readiness (psychological) which shows that emotions have a great influence in any action. Peace of mind is able to stabilize and control one's self from engaging in self-destructive behaviors and to be able to guide oneself to be more focused, confident and enthusiastic about doing something. In the context of this paper, the readiness of mathematics teachers includes the extent to which teachers are prepared from the aspects of knowledge, skills and attitudes to use the heutagogical approach in the teaching and learning of secondary school mathematics.

Hase and Kenyon were the first scholars to introduce heutagogy to advance pedagogy and andragogy (Hase & Kenyon, 2000). The term heutagogy is adapted from the ancient Greek "heutos", meaning "self", and "agogy" meaning "learning" (Hase & Kenyon, 2000). Heutagogy is defined by Hase and Kenyon as a study in which students determine how they learn (Hase & Kenyon, 2000). The main difference for the concept of heutagogy is when students are at the center of learning, while teachers are tasked with providing learning resources and acting as facilitators to guide learning (Blaschke & Hase, 2015).

Knowledge Readiness of Heutagogical Approach

Knowledge means a field of knowledge that needs to be explored and known to be possessed in order to form attitudes and behaviors. Before using the heutagogy approach in teaching and learning, teachers must be prepared with knowledge of the heutagogy concept. The heutagogical approach is divided into six main elements. The six main elements of the heutagogical approach are exploring, creating, collaborating, connecting, sharing and reflecting (Blaschke & Hase, 2015). In the 21st century learning era, good teachers are those who know how to use the heutagogical approach and foster self-directed learning through classroom teaching (Levy Feldman, 2018). The main focus of heutagogy is giving students the freedom to determine the teaching and learning that is appropriate for the student. Teachers and students work together in evaluating teaching and learning methods that are suitable for them.

The first element of exploring is considered the basis of heutagogy because the principle of heutagogy itself is self-directed learning (Blaschke & Hase, 2015). Students are allowed to explore their own learning style based on their needs. However, not all students can have freedom in learning and need help and guidance from teachers. Mathematics teachers need to help students explore the learning process and guide them in finding appropriate learning methods. Yusof et. al (2015) in his study stated that students themselves are impatient for teachers to do more active strategies in teaching and learning that will give them space to be involved in the learning process. This includes giving them a choice in how learning is conducted. When students are given the opportunity to explore their learning process, students will eventually become more independent in learning and be able to find new sources of knowledge in the future.

The second element is creating which gives students the opportunity to create their own learning approaches such as writing, designing and drawing (Blaschke & Hase, 2015). There are various learning mediums that can be used either online or offline that help students

create learning aids such as mind maps or presentation slides. Through this approach, students will become more creative because students are encouraged to create learning methods based on their needs. Karwowski (2010) states that creative students are usually considered to be more intellectually competent, dynamic and excited. In addition, these creative students use their creative imagination to give opinions and show things, which shows that creativity is not just a product. Therefore, with the right help and guidance from the teacher, creative students can be nurtured in the classroom alone.

The third element is collaboration which aims to provide an environment that students can learn from each other (Blaschke & Hase, 2015). Collaboration is one of the skills of the 21st century that requires students to show the ability to work in groups effectively and respect the views or ideas of different group members. Collaboration requires students to be flexible and willing to tolerate group members to achieve common goals and objectives. In addition, active collaboration will give students the opportunity to improve themselves in learning mathematics. Teachers will act as coaches who help the collaboration process in the group and encourage students to reach a common solution and only get involved if necessary (Blaschke & Hase, 2016). Good collaboration will only happen when students only get help from the teacher when there is a need and at the same time the teacher only gives a response or feedback when needed by the student.

The fourth heutagogical approach element is connected which means students have a learning network with each other through various media (Blaschke & Hase, 2015). The use of media in the learning process has been studied extensively and shows positive results. Communication through the media will improve quality and provide wider opportunities for students. In addition, when technology has become more affordable, the use of media such as social media in connecting with others allows the sharing of information, discussion and exchange of ideas from various mathematical disciplines to take place. There are various social media that are often used by generation Z born between 1996-2010 (McNeil, 2018) including Twitter, Facebook, Academia and Telegram. The use of media and learning resources can increase knowledge literacy in the era of the digital revolution.

Once students are able to connect with each other through various media, students will be able to share ideas or information they have (Blaschke & Hase, 2015). The fifth element of heutagogy is sharing. Students can share through various mediums including SlideShare, ResearchGate, Twitter, Facebook, and others. Through various platforms, students can share their knowledge and learning results with each other and get to know other students who have the same interests through searching knowledge materials shared on social media. This partnership also encourages the potential for the students to collaborate in the future. Teachers can help students to recognize the appropriate media to use for sharing and provide guidance on how to choose the best sharing through a critical and relevant search process. This sharing process is very beneficial for students to encourage self-exploration, develop digital literacy skills, and develop a learning community network.

The element of reflection is the sixth and last element in the heutagogical approach (Blaschke & Hase, 2015). Reflection is where students analyze and evaluate their learning process to create potential new learning spaces and improve existing processes. Through the process of reflection, students will appreciate knowledge more after going through hardships and pleasures to acquire the knowledge. Teachers can help students by giving ideas on how self-learning reflection can happen by giving appropriate examples. Teachers also need to assess whether the reflections produced by students are valid and on the right track through inquiry in the classroom. Previous research has shown reflection as an important part for teachers

especially in planning and improving their next teaching strategy (Mohamad et. al, 2019). By doing so, teachers must also have sufficient knowledge in doing reflection for an effective reflection process.

Skills Readiness of Heutagogical Approach

There are four teacher readiness through behavioral components in using the heutagogical approach among secondary school teachers in teaching and learning. Among them are (a) the ability to think openly, (b) the ability to foster collaboration, (c) the ability to learn and (d) the ability to accept ambiguity.

Teacher readiness through the first component which is the ability to think openly, the heutagogical approach requires teachers to be sensitive to the environment and respond to changes (Blaschke & Hase, 2015). For example, during the Covid-19 pandemic, teachers had to do teaching and learning at home. Teachers should be sensitive to this change and try to learn how learning can still take place even though previously learning was face-to-face. Next, the teacher's ability to foster student participation in cooperating in the group during the process of determining a decision. A tolerant attitude should be emphasized when this process is carried out. Teachers need to be an example to students when they are able to work in a group either as a leader or as a member of the group. The role of leader or member is indeed different but complement each other in a group. Teachers also need to constantly carry out internal and external evaluation of the effectiveness of this approach. Students need to be stressed that learning must happen even if learning methods are varied. The teacher's ability to filter information and study something is also synonymous with the component of open thinking. The use of technology now allows us to get any information at our fingertips. Even so, known information cannot be accepted arbitrarily without first going through the verification process. Therefore, teachers should be sensitive to the method of obtaining the correct knowledge and its validity is examined before sharing it with students.

The second component of teacher readiness is the ability of teachers to foster collaboration through interpersonal effectiveness (Blaschke & Hase, 2015). Good collaboration depends on effective communication between its members. Students need to emphasize the ability to constantly regulate themselves where excessive happiness or sadness should not be the cause of the loss of collaboration in a group. The ability to motivate other group members becomes a pillar in the effectiveness of collaboration. Teachers need to ensure that the direction of collaborative learning in a group is guided towards the knowledge to be learned based on learning objectives. Once completed, the teacher can also foster joy among students by rewarding the best group collaboration.

Next, teacher readiness through the third behavior is through learning ability (Blaschke & Hase, 2015). Teachers should study and learn the knowledge or subject to be taught in depth including various methods to convey the knowledge. The network and connections between teachers must be wide and easily accessible. Networking with fellow teachers from different schools helps teachers to know the appropriate methods to use for students of different levels. Teachers must also be able to share openly with other teachers. Through the heutagogical approach, teachers are required to manage knowledge so that it can be evaluated perfectly.

The fourth component of teacher readiness is to accept ambiguity. Kamus Dewan (2007) defines ambiguity as the ambiguity of something that can be interpreted into two or more meanings. Teachers should have the behavior of accepting ambiguous things in using the heutagogical approach (Blaschke & Hase, 2015). In managing a project, teachers are not sure

or vague whether the project will run smoothly or not. The courage of the teacher in this regard plays an important role in ensuring that every action has an impact that leads to the effectiveness of a project even if it takes a long time or has an occurrence over a long period of time. Social media also has its share of ambiguities. Teachers should act wisely by not trusting information without proving its validity. The act of filtering every piece of information received before sharing it with students must be the basis of using social media in teaching and learning. The use of social media to convey information should also be effective because social media has become the norm in students' lives today.

Attitudes Readiness of Heutagogical Approach

There are four teacher readiness through attitude components in using the heutagogical approach among secondary school teachers in teaching and learning based on four behavioral components such as the ability to think openly, the ability to foster collaboration, the ability to learn and the ability to accept ambiguity.

From an attitude aspect, thinking openly means when someone gives himself the opportunity to accept new ideas (Blaschke & Hase, 2015). These ideas usually come from reading and seeing people around. An open-minded individual's attitude is when they understand that freedom of speech is everyone's right and ideas that are thrown can be accepted or rejected based on the openness of the individual's own thinking. Teacher characteristics that can be associated with using the heutagogical approach in teaching and learning are being prepared to empower students or other fellow teachers to use this approach. Scientific discussions between teachers and students allow students to think often and give creative ideas from their own thoughts. It is well known that teachers and students come from two different generations. Thus, the teacher's encouragement and encouragement through discussion will train students to use the heutagogy approach in their lives because it is close to the concept of lifelong learning.

Next, in order to implement this heutagogical approach, teachers must be able to cultivate the nature of collaboration among students (Blaschke & Hase, 2015). Teachers should recognize the potential of students and give appropriate assignments and demand students to collaborate with each other. Teachers must be empathetic and optimistic with students. The teacher's optimistic nature will give space to students to believe in themselves that they are capable of teaching others and learning from their own peers even if they have differences of opinion. This difference in thinking needs to be celebrated in a group so that effective learning can occur by encouraging students to think creatively and critically. Teachers also need to be flexible to change according to the situation.

The teacher's willingness to change his own ideas and beliefs is an example of the teacher's willingness to use the heutagogical approach in learning ability (Blaschke & Hase, 2015). The teacher's attitude to be open to accepting other people's ideas or views to improve understanding of a learning context gives room for knowledge to grow and the teacher's thinking will become more critical. The teacher should be an example to the students when accepting the ideas thrown by the students but at the same time giving guidance so that the ideas are in line with teaching and learning. This acceptance will increase students' confidence to continue thinking and dare to express their ideas and opinions.

The ability to accept ambiguity means that teachers are ready to accept ambiguous things that allow two or more interpretations (Blaschke & Hase, 2015). While in class, teachers can control student learning but the control is at a low level. This is because self-directed learning requires students to freely choose the method that suits them. Teachers should understand that the

heutagogical approach is student-centered and no longer teacher-centered. Student-centered learning will cause teachers to be prepared to accept diverse learning methods according to the student's personality. Teachers need to be open minded and believe that experience is also one of the learning methods.

In using the heutagogical approach, the teacher must be moderate in the scale of perfection. The potential to understand something learning is different for each student. Thus, the use of a heutagogical approach that encourages students to explore learning methods requires the teacher to be patient and believe that learning will occur even on a modest scale. The attitude of teachers who have high stability and low anxiety makes the heutagogical approach work perfectly.

Challenges of the Heutagogical Approach

Zimmerman (2006) explained that teachers reject change for several reasons, among which are because of past experiences of unsuccessful changes, failure to identify the need to change, attitudes that are difficult to change and threats. The findings from Akyıldız (2019) found that most teachers have never heard the word heutagogy. The heutagogical approach is a new approach that gives full power to students to determine their learning methods. This change is deemed to threaten the teacher's authority in the class and the teacher's concern when students no longer respect the teacher as the source of information in the class (Akyıldız, 2019).

Tam (2014) on the other hand stated that teachers feel threatened because they feel lack of knowledge and experience to change existing teaching methods and lack of motivation to change. Teachers are also reluctant to let go of old habits in practice and lack psychological resilience to carry out change efforts (Kareem & Kin, 2018). Akyıldız (2019) in his study also stated that teachers are not ready for students to choose an assessment method that suits them. The heutagogical approach gives students the freedom to choose how their learning is assessed. Teachers think that how is justice in an assessment when students are assessed using different methods.

In addition, the occurrence of rejection in change because teachers want to avoid risk due to fear of the unknown (Le Fevre, 2014; Zimmerman, 2006). Teachers' concerns were expressed in Akyıldız 's study (2019) when teachers felt that students at the secondary school level could not control themselves in determining the best method for their learning. The teacher's concern stems from not being able to prepare students with appropriate grades to continue their studies at university because it takes too much time using the heutagogical approach that trains students to learn to learn. Teachers are convinced that conventional methods are better and students will gain knowledge more easily, quickly and accurately.

Conclusion

This paper aims to explain the factors of mathematics secondary school teachers' readiness to use the heutagogical approach in teaching and learning. Teacher readiness in terms of knowledge, attitude and behavior are identified as domains that need attention. Although there are concerns about this approach that will take so much time for students to get to know themselves, teachers should understand the concept of learning that is changing now. Comparison with conventional methods should be reconsidered because new methods are not intended to replace but to improve teaching and learning. Instead of using chalk and talk, mathematics teacher might use heutagogical approach to variate their style of teaching. A things to remember, that no one size fits all in teaching and learning.

Studies regarding the heutagogic approach in teaching and learning among secondary school teachers are still lacking because existing studies focus more on adult students, namely college and university students. Therefore, it is important that this study is conducted in the context of secondary schools so that existing knowledge and understanding in this field can be further developed. This study is able to provide some added value in terms of literature and the development of knowledge, especially regarding the readiness of teachers through the aspects of knowledge, attitude and behavior. Hence, as future research, the pattern of secondary school teacher readiness in applying heutagogical approach for teaching and learning should be explore to see how far the implementation in our school system.

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