

# Mathematics Trainer Readiness for PAK-21 Integration in Mathematics Teaching and Learning

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## Abstract

The purpose of this study was to determine the readiness of trainee teachers of Universiti Pendidikan Sultan Idris for integrating 21st century learning (PAK-21) in teaching and learning mathematics in schools. The readiness of trainees was seen from the aspect of interest, knowledge and skills. The study was conducted on 40 teachers of Mathematics trainees who are currently undergoing teaching training. The survey method is used to obtain data. The instrument of study used is a questionnaire. Data from the study were collected and analyzed using Pearson correlation,  $r$  to identify the relationship between aspects of PAK-21's interest, knowledge and integration skills. Overall, the results show that the level of readiness of trainee teachers is high in terms of interest, knowledge and skills in integrating PAK-21 in teaching and learning mathematics. In addition, the findings also show that there is a strong positive relationship between the aspects of interest and knowledge while the findings show a strong relationship between interest and skill aspects and knowledge and skill aspects. In conclusion, trainee teachers should be able to equip themselves with an education that is always ready to implement a new learning method or strategy in line with the current global trend of looking for a capable and resilient teacher for the rapid development of global education. The implications of this study are expected to benefit the prospective teachers of mathematics in preparing themselves to become a knowledgeable mathematics teacher on PAK-21 and know how to integrate it in their teaching. This study also provides a wealth of information on the aspects of teacher interest, knowledge and skills that are extremely useful in the implementation of 21st century learning especially in mathematics subjects in secondary school.

## Keywords

PAK-21, trainee teachers, mathematics teaching and learning, readiness, PAK-21.

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## Introduction

In the fast-paced era of globalization, the education system in Malaysia has experienced a drastic change not only in the use of introductory languages, but also in the use of computers in the teaching and learning process. New technological advancements have been spread all over the world and each country strives to develop their own country to build a stable, developed and competitive nation. Therefore, nowadays, many educators around the world have switched to the use of mobile phone applications and social media such as Facebook, Instagram, WeChat, Tweeter, WhatsApp and Telegram to facilitate the delivery of information and knowledge to students (Latifah et al., 2020). This phenomenon of T&L methods also occurs in Malaysia. The construction and development of new countries based on the vision of the country must be accomplished through a variety of methods that can be used. Thus, students who are created need to have high level of thinking, innovative, prudent, self-reliant, technologically literate, able to invent and solve problems and make decisions. Besides, students need to be actively involved in T&L activities (Ahmad Fauzi et al., 2018). This can be achieved by integrating PAK-21 within the teaching and learning (T&L) (Mohamad, 2016).

PAK-21 is one of the agendas emphasized in the Malaysian Education Development Plan (PPPM) 2013-2025. Therefore, continuous efforts must be made by the Ministry of Education Malaysia (MOE) to improve and strengthen PAK-21 to attract more teachers to integrate PAK-21 within the support of the various stakeholders. Some basic concepts of education need to be mastered in PAK-21. These basic concepts include the concept of collaboration, the concept of creativity, the concept of communication and the concept of critical thinking. PAK-21 can engage students through fun, engaging and challenging activities.

Higher order thinking skills (HOTS) is a very important skill to be conquered by teachers and students in raising the level of national education at the global stage (Mazlini et al., 2018). The challenge of 21st century education is to provide learning that is geared towards HOTS and manage a more dynamic classroom. Besides that, a comfortable and safe classroom also must be equipped with basic amenities such as blackboard, word board and appropriate room space (Mazlini & Nur Haslisa, 2019). 21st century education also requires teachers to convert mathematics T&L from traditional methods to technological, creative and innovative methods (Mazlini & Kogilavani, 2019). Therefore, this challenge is faced by teachers in schools when teachers need to find initiatives on how to use various sources of technology and information to implement effective and quality teaching and learning that is relevant to current developments (Mazlini et al., 2019). To cope with this challenge, teachers need to constantly update their knowledge (curriculum content) and competencies (pedagogy of education) in order to stay relevant to future needs. PAK-21 requires a teacher to think, discuss, design, plan and make decisions based on the 21st Century Partnership Model (Partnership for 21st Century Skills, 2015). Teachers need to diversify into the PAK-21 method where teachers need to focus on the elements of critical thinking skills, collaboration skills, creativity and communication skills.

Studies on teacher preparedness in implementing 21st century learning in education have been extensively conducted but studies on the application of PAK-21 to teacher readiness in particular in mathematics have not been conducted. Therefore, this study is expected to help teachers overcome the challenges of integrating PAK-21. This is because, PAK-21 is very useful in today's globalized world. Therefore, a study on teacher readiness for PAK-21 integration needs to be undertaken so that it is in line with the Malaysian Education Development Plan (PPPM) 2013-2025 in developing a people with critical thinking, collaboration skills, creativity and communication skills.

## Methodology

This study used quantitative design. Quantitative approaches are a form of approach that requires in-depth research. Cresswell (2014), quantitative research is a form of educational research that decides what to study, asks specific questions by narrowing the scope of the question, collecting data from respondents, analyzing numbers using statistics and conducting interviews in an objective and objective manner. In order to obtain information from the respondents, the questionnaire method was chosen to facilitate the examination of the dominant factors through previous studies in the literature review. It is intended to obtain the answers

provided only within the scope of the objective that is to be achieved and not run out of ideas related to the factor. This method is also easier to evaluate based on the answers the respondents want to choose.

The population of this study is the trainee teachers of mathematics programs (AT14 and AT48) from Universiti Pendidikan Sultan Idris (UPSI) who is undergoing training and have been past teaching in the school. The sampling method is a simple random sampling. The study sample consisted of 40 mathematics teacher teachers. Of these, 9 respondents were male (22.5%) while female trainee teachers were 31 (77.5%). In terms of the race, a total of 27 respondents are Malays (67.5%), 6 Chinese (15.0%) and Indians 4 (10.0%).

The instrument used in this study is a set of questionnaire. The questionnaire is a adapt and adopt from the study of Norfaizah and Mahizer (2019). It's consisting of 2 parts: Part A: Demographics (6 items), Part B: Readiness (13 items), knowledge (13 items) and skills (13 items). Part A deals with the respondents' demographics namely gender, age, race, teaching experience, academic status and involvement of PAK-21 courses. Part B contains 13 questionnaires related to the teacher's interest in implementing PAK-21, 13 items related to the level of knowledge of the trainee teacher in implementing PAK-21, and 13 items to find out how well the math teacher's skills are implemented in the PAK-21 process. Likert scales 4 (Strongly Agree (STS), Disagree (TS), Agree (S) and Strongly Agree (SS)) were used and respondents only rounded out the appropriate numbers in response to the items provided in the questionnaire.

**Table 1 The Level of Readiness of The Trainee Teachers in terms of Interest, Knowledge and Skills**

Variable	Number of items	Mean
Interest	13	3.22
Knowledge	13	3.19
Skills	13	3.00

## Result and Discussion

### Level of Ability

Table 1 shows the readiness level scores of the aspects of teacher interest, knowledge and skills in integrating PAK-21 in mathematics. Based on the overall mean analysis for the interest rate of mathematic teachers is 3.22, knowledge is 3.19 and skills is 3.00. This shows that the level of readiness of mathematics teachers in terms of interest, knowledge and skills in integrating 21st century learning is high (Pallant, 2013). Teachers who are always interested and positive will always have a positive impact on student learning and achievement. The conclusion is that the level of readiness for mathematics teachers to integrate PAK-21 in terms of interest, knowledge and skills in this study is at a high level. This indicates that respondents are very interested, knowledgeable and highly skilled in integrating PAK-21 in teaching and learning mathematics.

This study is supported by a similar research conducted by Nurul Huda (2013) that studied the teachers' knowledge in the field of interest, emotion, and competency-based learning (PBK), and teachers who used and conceptualized the concept of PBK, and teachers who possessed such information and abled to utilize it properly. Interest and knowledge are one of the capabilities of a good teaching and learning (T&L) process. The findings are in line with a study done by Norwegian (2012) that found 87.4% of teachers were able to spend time in improving and increasing their knowledge.

Further, the findings of this study are also in line with previous research findings such as the study by Siti Zaleha (2015) where the findings of her research show that teachers' knowledge is at a high level. In addition, the study of Siti Zabidah (2006) and Sharifah Nor (2012) also found that teachers need to be knowledgeable especially in thinking skills especially in the teaching and learning process. This finding was supported by Aznita (2014) in her study of the level of readiness of Mathematics teachers in implementing the standard Primary school mathematics curriculum in Johor Bahru which found that 94.4% of respondents agreed that they were aware of the formation

of the new curriculum and as implementing agents of the curriculum, teachers needed to understand the content of the curriculum to make the curriculum successful.

In addition, the findings of this study are also supported by Zamri (2014) who found that teachers' skills in implementing teaching are of high quality. This is because, if the teaching of the teacher is still using traditional methods and regardless of the aspect of thinking skills then it will greatly influence the achievement of students in the classroom. According to a study by Aznita (2014) on the level of readiness of Mathematics teachers in implementing the Primary school mathematics curriculum, it was found that the majority of the study sample had a high level of readiness from the aspects of high skill to implement the standard based curriculum (KSSR). KSSR was introduced as an effort to restructure and improve the current curriculum to ensure that students have the relevant knowledge, skills and values to face the challenges of the 21st century (MOE, 2013). The findings of this study are also supported by Nurul Huda (2013) who found that the level of teacher readiness in the area of skills in the implementation of the PBK is at a moderate level and that teachers are prepared and have a positive attitude towards implementing these skills. The positive skill is also in line with the findings of this study where the majority of respondents gave positive feedbacks in their implementation.

The results of this study show that the level of readiness of Mathematics teachers in the school from the aspect of skills in implementing PAK-21 is at a moderate level. It is supported by Najua Syuhada (2013), that the level of readiness of mathematics teachers in the implementation of School-Based Assessment (PBS) is at a moderate level of readiness in terms of skills in the implementation. Referring to the open response analysis, this study found that teachers identified problems with other tasks as well as time constraints that caused teachers to become less skilled in implementing 21st century T&L in the classroom. However, this study considers teachers' readiness in the areas of skills important in making this teaching and learning process possible so that MOE's pure desire can be achieved successfully.

The overall conclusion was the respondents had high interest, knowledge and skills in concepts, characteristics and types and had good interest, knowledge and skills to integrate PAK-21 in mathematics. This indicates that most respondents were aware of and experienced early exposure to 21st century learning and the importance of implementing it in the classroom.

## Correlation of Analysis in Terms of Interest, Knowledge and Skills

**Table 2 Interest, Knowledge and Skill Correlation**

Correlation	Correlation Value	<i>p</i> ( $\alpha=0.05$ )
Interest vs Knowledge	0.807	0.000
Interest vs Skills	0.517	0.000
Knowledge vs Skills	0.497	0.000

Table 2 shows the correlation analysis of the interests, knowledge and skills of the teachers in integrating PAK-21 in mathematics. The results of the correlation analysis conducted between interest and knowledge, were found to be significant at the 0.807 correlation value. This indicates that the factor of interest has a high positive correlation with knowledge in integrating PAK-21 in the T&L of mathematics in schools. Therefore, there is a significant relationship between interest and knowledge in implementing PAK-21 in teaching and learning mathematics at schools.

The results of the correlation analysis conducted between interest and skill, were found to be significant at a correlation value of 0.517. This indicates that the interest aspect has a moderately high positive correlation with skills in implementing PAK-21 in mathematics in schools. Therefore, there is a significant relationship between interest and skill in implementing PAK-21 in T&L at schools. This finding is in line with Norhaya's (2015) study which also found that teachers' positive emotions and emotions towards learning were related to the level of teacher implementation skills. Good readiness in terms of interest and skills enables teachers to be more efficient in implementing PAK-21 in schools. The findings of this study are also found to be similar to those who found in the Journal of Applied Psychology, where a study involving 2,168 workers found that an element of interest influenced 62% of skills performance and this was considered a significant impact (Bailey, 2015).

Further, the results of correlation analysis conducted between knowledge and skills, were found to be significant at the 0.497 correlation value. This indicates that knowledge aspects have a relatively high positive correlation with skills in integrating PAK-21 in school mathematics. The

findings of this study support the findings obtained from Mohamad Khamidon's (2016) study and also support by Aznita (2014) that a high level of computer or technology knowledge among teachers is a necessary force in teaching. According to Noriati's (2010) study, teachers' knowledge and skills are at a moderate level in the use of educational technology in PAK-21. This problem is due to teachers being less exposed to the latest applications as a medium to help them implement the teaching. It is clear that the findings of this study have a significant relationship with the knowledge and skills of Mathematics teachers in implementing PAK-21 in schools. According to Kamaruzaid (2006), teachers in schools are wise to find space and constantly strive to improve their knowledge and skills levels by formulating question papers or evidences for the subjects taught. According to her research, teachers are encouraged to further develop their knowledge of PAK-21 such as attending courses on PAK-21 in teaching and learning in schools and so on to enhance teachers' knowledge and skills in conducting PAK-21 for students.

## Conclusion

The study was conducted to look at the level of readiness of Mathematics teachers based on the implementation of PAK-21 integration in mathematics. Overall, the level of interest, knowledge and skills shows a high level. Correlation analysis also showed that there was a significant relationship between interest, knowledge and skills in integrating PAK-21 in mathematics. In conclusion, the trainee teachers are prepared and have sufficient knowledge and skills to integrate PAK-21 in schools. Teachers are also prepared with interest, knowledge and skills in ways that can create a more holistic PAK-21 teaching environment in schools.

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