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A Pilot Study in Southern Region Primary School: Are Design and Technology Teachers Ready to Teach Programming?

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Abstract

This is a pilot study on the teachers' competency in teaching programming education in primary schools. In response to the growing demand for professionals in the field of computer science, many countries have started to promote programming to young students. Malaysian education also in line with this change. Programming education in primary schools can be highly beneficial for kids as it can develop their logical thinking, creativity, and problem-solving skills. The implementation of an effective programming education needs teachers with good competency. The aspect of competence intended in this study refers to 3 elements in KSA Model which consist of knowledge, skills, and attitude. A quantitative survey was employed to explore the competency of primary school Design and Technology (D&T) teachers in programming. The data was gathered through Google Form online survey. The survey was announced through programming workshop called "Scratch for All" held in Universiti Teknikal Malaysia (UTeM), Melaka. The teachers involved are from 46 schools across three southern Malaysian states, Melaka, Negeri Sembilan, and Johor. As the purpose of this pilot study is to verify the items in questionnaire, the result obtained showed that the items for programming knowledge among D&T teachers had a reliability index of = 0.903, the programming skills items were at = 0.945, and the items measuring teachers' attitudes towards programming were at = 0.933. All the result showed a good determining factor for the planned study. As conclusion, all items in sections (b), (c), and (d) can be used in the planned study to identify the competency of D&T teachers regarding the teaching of programming in primary schools.

1. Introduction

As the world evolve, our lifestyle, the way we work and the way people communicate with each other are being changing by new technologies. The global landscape of education is being impacted by the rapid changing of global economic, technology and industrial growth. In response to the growing demand for professionals in the field of computer science, many countries have started to promote teaching children and young students on how to write computer program. Arslan and Çelik (2022) stated that learning to code is a crucial step for kids to stay up to date with the modern world in a century where technology continues to develop quickly. According to Allsop (2019)

growing attention has been given in recent years to introduce programming education in elementary schools. Many governments around the world now require that educators teach coding from early education upwards (Rich *et al.,* 2019). Mannila *et al.* (2020) also highlighted that programming is broadly introduced in the school curricula around the world currently. Programming education for children is not a new trend. According to Mannova (2022), the trend of teaching programming in schools has started since 2014 in most countries in the world such as the United Kingdom, the United States and the Czech Republic. Research by Predrag (2021) found that computer programming has become a compulsory topic in primary education in countries such as Finland, England, Estonia, Sweden, New South Wales in Australia, Japan, the United Kingdom, Slovakia, Poland, France, Ireland and Croatia.

The implementation of programming education in primary schools can be highly beneficial for kids. It can develop their logical thinking, creativity, and problem-solving skills at a young age. Research by Nouri *et al.* (2020) identified that learning programming can help in develop general skills related to digital competency and 21st century skills, including cognitive skills and attitudes, language skills, collaborative skills and attitudes and creative problem-solving skills and attitudes. Papadakis (2021) also highlighted that programming education for young leaners should not only be code wizards, they should also be students who can apply their skills to solve problems. The only way to do this is to have a solid understanding of how to identify specific problems, how to communicate effectively, how to problem solve, and think creatively. All the skills that the children gain through learning programming can help them to develop and equip them with much-needed skills for the digital age, particularly prepare them for their future job market. Programming skills are becoming increasingly important for a wide range of careers in the modern digital age. As a highly in-demand skill, computer programming can give students a competitive edge when applying to colleges or for jobs (Ponsard, 2019).

However, Muhamad Yusof *et al.,* (2021) stated that programming skills among primary school teachers in Malaysian primary school is at a low level. Programming education is taught through Design and Technology (D&T) subject after the Information and Communication Technology (ICT) subject was abolished. Muhamad Yusof *et al.,* (2021) in their research founded that D&T teachers are less competent in implementing programming teaching and learning sessions due to their limited programming knowledge and skills due to insufficient training. Therefore, it is important to recognize the current level of teachers programming competency in order to develop the professional training framework necessary to improve the competence of D&T teachers in the field of programming.

The purpose of this pilot study is to verify the items in survey questionnaire which includes 3 elements in KSA Model that measure the level of programming knowledge among D&T teachers, the level of programming skills among D&T teachers, and teachers' attitudes towards programming. The result obtained in this pilot study can help researcher to determine the suitable items that can be used in the planned study to identify the competency of D&T teachers regarding the teaching of programming in primary schools.

2. Literature Review

Badrulhisham *et al.* (2019) stated that the Industrial Revolution 4.0 will be extremely challenging for the field of education. In this digital age, education ought to correspond with industry developments to maintain a balance between education and future labor demand. Abu Bakar *et al.* (2018) pointed out that programming education is one of the most important fields for students to learn in order to face the 4th Industrial Revolution in the 21st century. The statement is in line with Koyuncu and Koyuncu (2019) which stated that in the 21st century, knowing how to program is an important skill for students to acquire. It stimulates their creativity, gives them the skills to navigate the digital world, and gets them ready for a technologically dependent future. A new generation of innovators, problem solvers, and contributors is made possible by embracing programming education.

2.1 Programming in Malaysian Primary Schools

Malaysia is also keeping up with changes in the international educational landscape brought on by the industrial revolution. 4.0. According to Badrulhisham *et al.* (2019), the Industrial Revolution 4.0 will be extremely challenging for the field of education. In this digital age, education ought to correspond with industry developments to maintain a balance between education and future labor demand. Changes in the national curriculum need to be emphasized in order to meet the challenges of the era of industrial change. Abu Bakar *et al.* (2018) pointed out that programming education is one of the most important fields for students to learn in order to face the 4th Industrial Revolution in the 21st century.

As programming are important skills and competencies needed in the 21st century, programming has been introduced in the Malaysian education system (Muhamad Yusof *et al.*, 2021). Malaysian Ministry of Education (MoE) through the Malaysia Education Blueprint 2013-2025 has started to implement programming education for primary school students started from 2016. While, for secondary school students they are introduced to the programming started from 2017. MoE introduced programming education to primary school students through the Standard Primary School Curriculum (KSSR). While, for secondary schools programming education

introduced through the Standard Secondary School Curriculum (KSSM). Programming education was implemented in the primary school curriculum through the Information and Communication Technology (ICT) subject starting with students in year 6 in 2016. However, after the ICT subject was abolished under KSSR Revision 2017, from year 2020 level 2 students; particularly students from year 4 to year 6, will learn programming through the new subject namely Design and Technology (RBT) (Muhamad Yusof et al., 2021). At the high school level as well, students in grades 1 to 3 learn programming through Design and Technology subjects. While, for students in form 4 and 5, they learn programming through the subjects of Design and Computer Science.

2.2 Programming Tools for Primary School - Scratch

There are various programming tools that have been introduced to elementary school students around the world. Each country has a different tendency towards the programming tools chosen for learning in schools. According to Serife *et al.* (2020), the selection of programming tools is based on several factors such as suitability according to the target group, content of programming tools, and educational environment.

Sırakaya (2018) pointed out that block-based programming is a suitable tool for children to start learn programming because it is easy and fun. This statement is in line with the statement of Arslan and Çelik (2022) who stated that block-based programming is a tool that allows children to enjoy activities while learning the basics of programming. Block-based programming is more suitable for children's level because it uses methods like drag and drop instead of writing complex code. Amanullah and Bell (2020) highlighted that there are various block-based programming tools that have been created and introduced to teachers and students to support programming learning at many levels of education. Block-based programming tools such as Scratch, Mblock, Alisblock, code.org, thinkerCad circuits, blockly, and alice are among the appropriate programming tools for young students (Serife *et al.*, 2020). Block-based programming can help to avoid syntax errors. Arslan and Çelik (2022) also stated that block-based programming tools have become an important component of computer science curricula for school and university classrooms.

In the curriculum of Design and Technology subjects in Malaysia, there are three programming tools that need to be taught by RBT teachers and mastered by students. Year 4 students have to learn programming using Scratch, mBlock for year 5 students and Editor MakeCode for year 6 students. All these three programming tools are block-based tools and very suitable for learning at the primary school age. However, in this pilot study the programming tools that have been use during the workshop is focused on Scratch only. Scratch is a web-based programming tool that enables the creation of media projects such as games, interactive stories and animations. Scratch developed by the Media Lab at MIT is a kid-friendly programming tool. It is designed to introduce programming to children and teenagers (Liao, 2022).

2.3 Teacher Competency to Teach Programming

Design and Technology (D&T) subject previously known as Living Skill subject, which involve hands-on activities during the classroom. Through Living Skill subjects, students have used to work with hand tools for the purpose of carpentry, electric and electronic, gardening, and sewing projects. However, after the implementation of KSSR Revision 2017, the ICT subject was abolished. Previously programming was learned through ICT subject teach by ICT teachers. But, started from 2020 level 2 students; particularly students from year 4 to year 6, will learn programming through the Design and Technology subject. Teaching new area of expertise without enough training will give a major challenge for the Living Skill teachers. Among the factors that affect the level of competence of D&T teachers is that D&T teachers do not have specific knowledge and training regarding programming because this field has just been inserted into RBT subjects after the abolition of ICT subjects that started in 2020. Hammond *et al.* (2020) highlighted that good teachers are able to bridge gaps between pedagogical theories, professional knowledge, and practice by drawing on their experiences. However, in this issue, it seems like D&T teachers face with the challenge to teach programming because they do not have adequate knowledge and skills as the programming in new subtopic in D&T subject. Luisa *et al.* (2021) pointed out that lack of subject knowledge is a major challenge. Teachers will face with cognitive issues such as limited and outdated subject knowledge. Teachers do not feel that they have adequate digital competence, yet are supposed to teach children to become digitally competent (Kjällander *et al.,* 2021). The teacher's ability and competency to teach programming is a crucial foundation for the implementation of programming education. Computer programming skills among teachers will be a catalyst to produce students who can contribute to the development and advancement of digital technology and act as creators of new technology (Mohd Shukri et al, 2020).

The role of teachers in the education system is considered a significant element. Teacher competency is the key to effective and quality teaching. Competency is the ability, skill, and strength of an individual to perform any given task. (Parveen *et al*., 2021). For the implementation of effective programming teaching, teachers need to have good competence level in the field of programming. The aspect of competence intended in this study refers to 3 elements in KSA Model which consist of knowledge, skills and attitude. The terms “competency” was

resounded by Boyatzis (1982) in his book – The Competent Manager. Boyatzis (1982); Mathur *et al.* (1998) defined competency as a combination of knowledge attributes (cognitive), skills (psychomotor), practical understandings, and attitudes (affective domains such as motivation and personality) are shown in behavior forms when doing something. A lack of knowledge in any of these areas; content, technology, or pedagogy could be a knowledge barrier for teachers of coding, computing, or robotics (Mason, 2019). Programming teachers should possess appropriate competency such as knowledge and awareness of technological advancements, strong teaching skills in object-oriented programming, and good attitude and belief towards programming. According to Muhamad Yusof *et al.* (2021), programming learning sessions are frequently interrupted and take a long time to implement because of the low level of competence among teachers.

3. Materials and Method

A quantitative survey method was employed to explore the level of programming knowledge, programming skill and attitude towards programming among primary school D&T teachers. The information was gathered through a self-administered Google Form online survey. The survey study was announced through a programming workshop called "Scratch for All". Scratch is one of the well-known programming tools for primary school level. This event aimed to promote programming education and encourage the students and D&T teachers to develop programming skills. The workshop was held on 13 September 2023, 8:00 am until 4:00 pm in Faculty of Information and Communication Technology, Universiti Teknikal Malaysia (UTEM), Melaka. This event organized by the collaboration of UTEM and SK Convent Infant Jesus 1. This event also recognized by Malaysian Board of Technologists (MBOT). The trainers for this workshop are UTEM lecturers with the help of UTEM students as facilitators.

There are 46 schools from 3 states in the southern region of peninsular Malaysia involved in this programming workshop, namely Melaka, Negeri Sembilan and Johor. Each school represented by 1 teacher and 3 students which made up 138 workshop participants altogether. The teachers involved are teachers who teach D&T subject. While, the students are from level 2 students; Year 4, Year 5 and Year 6 students. The participants then divided into 6 groups to occupied 6 computer labs for the workshop. During the workshop, 1 lecturer and 4 UTEM students will guide and assist D&T teachers and primary school students in each computer lab.

As this study is focused to explore the level of programming knowledge, programming skill, and attitude towards programming among primary school D&T teachers in Melaka, only teachers are involved in this study; not the primary school students. Thus, the population for this study was 46 primary school D&T teachers who involved in the workshop. The participants of this workshop were given 2 weeks' time after the workshop to complete the online questionnaires. Out of all 46 registered participating schools in this programming event, only 34 teachers completed the online survey (n=34).

The questionnaire was divided into 5 sections; (a) demographic / background of the respondents, (b) questions related to programming knowledge, (c) questions related to programming skill possess by D&T teachers, (d) questions regarding teachers' attitude towards programming education, and (e) questions related to the challenges faced by D&T teacher to teach programming in primary school level. There are 10 questions for each section (b), (c), and (d) which focus on knowledge, skill and attitude. Five-point Likert scale was used to interpret the data for (a), (b), (c), and (d). While, for section (e) the question used is open-ended style. Respondents can type the challenges they have faced during programming class freely.

The questionnaire was adopted and adapted from Omar *et al.* (2020) studies on knowledge, skills and attitudes competency among TVET teachers in Malaysia. The questionnaire was modified and being verified by the experts. The purpose of conducting the pilot study is to evaluate the consistency (reliability) items of aspects, item level, objective, item understanding, the usability of the item and the instruction of the item itself (Chua, 2006). According to Hicks (1999), Cronbach's Alpha > .70 means the questionnaire is good. While, Pallant (2000) stated that the questionnaire had good internal consistency if Cronbach's Alpha =.92.

Based on the reliability index, the items for programming knowledge among D&T teachers was at $\alpha = 0.903$, a good determinant factor for the planned study. The items for programming skill among D&T teachers was at $\alpha = 0.945$, an excellent determinant factor for the planned study. While, the items for attitude towards programming among D&T teachers was at $\alpha = 0.933$, also an excellent determinant factor for the planned study. Thus, all the items in section (b), (c) and (d) are suitable to be used in the planned study in order to identify and explore about the programming education in primary school from the aspect of knowledge, skill and attitude among D&T teachers.

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4. Result and Findings

4.1 Research Findings 1: Demographic

Demographic factors are important to be defining in every research because this section will reveal the background information about the respondents that involve in the research. The data analysis for demographic factor was carried out using descriptive analysis which includes frequency, mean score, percentage and standard deviation. To identifying the respondents' demographic factors; gender, age, educational level and years of teaching experience of the teachers, the questions were asked in the survey questionnaire through section A.

The result of the analysis of respondents' demographic according to each factor showed in Table 1 in details. Most of the respondents are female (79.4%). The highest respondents' age range that involved in this study are from 30-39 years old. While, for the educational level, most of the respondents have Bachelor Degree (70.6%). For the years of teaching experience, the data showed that most of the respondents involved are experienced teachers with more than 10 years of teaching experience. This shows that they are experienced teachers.

Table 1 *Data distribution of respondents' demographic background*

Demographic characteristics		Frequency	Percentage (%)
Gender	Male	7	20.6
	Female	27	79.4
Age	20-29 years old	4	11.8
	30-39 years old	15	44.1
	40-49 years old	10	29.4
	50-60 years old	5	14.7
Educational level	Diploma	1	2.9
	Bachelor Degree	24	70.6
	Master Degree	9	26.5
Teaching Experience (in years)	1 to 5 years	6	17.6
	6 to 10 years	7	20.6
	More than 10 years	21	61.8

4.2 Research Findings 2: Level of Knowledge Competence Among D&T Teachers

To determine the competency level of D&T teachers on knowledge aspect, respondents have to answer all the questions in section B. There were 10 questions in this section, which was indicated by the labels K1 to K10. The 5-point Likert scale was used to calculate the mean score and interpret it in accordance with the predetermined level. The SPSS software calculated the mean score to determine the level of knowledge competency among D&T teachers. In a practical workshop setting, the knowledge competency covered pedagogical, demonstration, and presentations of teaching practices. Table 2 provided results and details description of each item.

Table 2 *Level of programming knowledge competence among D&T teachers*

No	Item	M	S.D
K1	I am knowledgeable in applying demonstration teaching methods during a practice-based learning environment.	3.79	.978
K2	I am knowledgeable in facilitating students during a practice-based learning environment.	3.79	.914
K3	I am able to use my knowledge in teaching and facilitation sessions well.	3.82	.904
K4	I always seek / refer for expert opinions to improve my knowledge.	4.35	.774
K5	I am interested in improving my knowledge by learning about existing technology and the latest technology.	4.44	.660
K6	I have the knowledge and ability to operate the technological equipment in my workshop well.	3.68	.945
K7	I am knowledgeable in using various teaching and learning strategies to stimulate students' interest in programming.	3.62	.888

K8	I am knowledgeable and proficient in several types of programming tools. (scratch, mBlock, EditorMakeCode, etc)	2.88	.880
K9	I am aware of the importance of the mastery of knowledge in the field of programming to my students in the future.	4.12	.946
K10	State how many programming tools that have been mastered. (scratch, mBlock, EditorMakeCode, etc)	1.38	.652

According to Moidunny (2009) in the mean score interpretation table, the mean score 3.21- 4.20 is in high category. The findings revealed that the competency level of D&T teachers on knowledge aspect and all its eight constructs (K1, K2, K3, K4, K5, K6, K7, and K9) show in high category mean score. The standard deviation of less than 1, means that the variations in respondent's opinions were small.

While, the mean score for K8 is 2.88 (SD = .880) and K10 is 1.38 (SD= .652) is the lowest value among all 10 questions in this section. Both questions are interrelated to each other. The mean score value is lower because majority of respondents have knowledge about 1 programming tool only. From the collected data, researcher identified that there are also respondents who are inexperience in any form of programming tools.

Table 3 is the details of the types of programming tools mastered by D&T teachers answered by the respondents. Scratch is the most familiar programming tool among D&T teachers in this pilot study. According to Mitchel *et al.* (2009), the most successful educational programming language today is Scratch. Scratch developed by the Media Lab at MIT is a kid-friendly programming tool. It is designed to introduce programming to children and teenagers (Liao, 2022). In Malaysian curriculum for Design and Technology subject, there are three programming tools used which are Scratch for year 4 students, mBlock for year 5 students and EditorMakeCode for year 6 students. All three of these tools are block-based tools.

Table 3 *Types of programming tools mastered by D&T teachers*

No	Programming tools	Frequency
1	Scratch	12
2	EditorMakeCode	7
3	mBlock	4

4.3 Research Findings 3: Level of Skill Competence Among D&T Teachers

In order to determine the level of competence among D&T teacher on skills aspect, the respondents are required to answer section C. Questionnaires in section C are consist of 10 items; S1 to S10. This section emphasized on skills possession of D&T teachers in teaching programming. The detail of the findings is described in Table 4. The mean score for S2 is 3.12 (SD = .844), S3 is 3.06 (SD= .983) and S10 is 3.18 (SD= .834) is the lowest value among all 10 questions in this section. All these three questions are interrelated to each other. These 3 items reveal the teachers' programming skills and the teachers' ability of using programming tools among D&T teachers are still not satisfactory. According to mean score interpretation by Moidunny (2009), item S2, S3 and S10 are in medium category mean score. The other items (S1, S4, S5, S6, S7, S8, and S9) show in high category mean score which revealed the level of programming skill competency among RBT teachers.

Table 4 *Level of programming skill competence among D&T teachers*

No	Item	M	S.D
S1	I am skilled and competent in my area of expertise.	3.59	.957
S2	I master the skills of using several programming tools well. (EditorMakeCode, scratch, mBlock, etc)	3.12	.844
S3	I am able to teach using some programming tools well. (EditorMakeCode, scratch, mBlock, etc)	3.06	.983
S4	I am always ready and eager to improve my programming skills.	4.00	.921
S5	I can diversify my teaching methods/strategies to help students understand and master programming learning content.	3.50	.929
S6	I am creative in teaching programming topics to get students interested to learn programming. (Produce games, quizzes, etc)	3.44	.991
S7	I am skilled in controlling student discipline throughout the practical session in the computer lab.	3.79	.808

S8	I am proficient in using technology equipment during practical teaching session in the lab. (LCD, PC, programming tools, etc)	3.76	.855
S9	I am skilled in helping students learn to use technology equipment in the computer lab.	3.62	.985
S10	What is your level of proficiency in programming?	3.18	.834

4.4 Research Findings 4: Level of Attitude Competence Among D&T Teachers

Section D of the questionnaires revealed the level of attitude competence among D&T teachers towards programming in primary school. There were 10 items in this section, which was indicated by the labels A1 to A10.This section discussed the attitude aspect that become the determinant factors of competency level among D&T teachers in programming. Table 5 described the findings in detail. According to Moidunny (2009), the mean score interpretation for all the items in this section show in high category and very high category mean score. This means that the D&T teachers have a good attitude towards programming.

Table 5 *level of attitude competence among D&T teachers*

No	Item	M	S.D
A1	I am always positive and accept technological changes with an open heart.	4.50	.615
A2	Programming is a lot of fun and stimulates my interest to keep exploring and experimenting.	4.21	.946
A3	I always teach my students first before doing programming practical.	4.12	.844
A4	I am ready and excited to join the practical course to improve my skills in the field of programming.	4.29	.871
A5	I participated in paid workshops / classes to gain additional knowledge to master the field of programming.	3.24	1.304
A6	I am excited to learn programming before teaching sessions to students such as self-study through YouTube and so on.	3.94	.886
A7	I am always passionate about encouraging my students to explore programming tools in a hands-on learning environment.	4.15	.784
A8	When there is a question/problem that cannot be solved during the practical session with the students, I keep thinking about it and find a solution afterwards.	3.94	.814
A9	I teach according to DSKP without skipping / changing the skills that students need to master, especially programming topics.	3.97	.904
A10	I am willing to share knowledge with colleagues.	4.32	.638

4.5 Research Findings 5: Challenges Faced by D&T Teachers in Teaching Programming

At the end of the questionnaire, there is one section for open-ended question in section E provided to the respondents in order to get the information about the challenges they have faced to teach programming in primary school. Respondents can type in some of the challenges that they think will hinder the effective teaching and learning of programming. The answers from respondents were organize and categorize into few themes as shown in Table 6. Table 6 exposed the challenges faced by D&T teacher in programming teaching and learning session in details. There are 10 challenges that can be identified through this study. To implement an effective programming session, all these challenges need to be overcome. The teachers' programming competency can be improved by providing enough training and workshop.

Table 6 *Challenges faced by D&T teacher in programming teaching and learning session*

No	Challenges
1	Teachers lack of experience and skills in the field of technology
2	Teachers lack knowledge about programming
3	Teachers lack programming skills
4	Lack of programming training for teachers

5	Lack of ICT tools (hardware-computer)
6	Unstable and slow internet
7	Lack of programming tools (micro controller board, robotic set, etc.)
8	The level of the primary school syllabus is too high for students
9	Too many students in the class. Hard to help and control
10	High cost of hardware (micro controller, other robotic components). Insufficient allocation from KPM to buy programming tools for students

4.6 Research Findings 6: Correlation Between Knowledge, Skills and Attitude

To identify the correlation between all 3 aspects of competency; knowledge, skill and attitude, Pearson correlation was employed. The Correlation table revealed the correlation between teachers' programming knowledge, programming skills, and attitude toward programming. Table 7 shows that the p-value for each construct involved is the same; .000. Since the p-value of .000 is less than .05, it can be concluded that there is a highly significant relationship between all the aspects of competency.

Table 7 *correlations between knowledge, skill and attitude*

		Knowledge Mean	Skill Mean	Attitude Mean
Knowledge Mean	Pearson Correlation	1	.833**	.713**
	Sig. (2-tailed)		.000	.000
	N	34	34	34
Skill Mean	Pearson Correlation	.833**	1	.791**
	Sig. (2-tailed)	.000		.000
	N	34	34	34
Attitude Mean	Pearson Correlation	.713**	.791**	1
	Sig. (2-tailed)	.000	.000	
	N	34	34	34

**. Correlation is significant at the 0.01 level (2-tailed).

5. Conclusion

Evaluating the level of teachers' competency is as important as we evaluate students' performance in the classroom. Teachers play a crucial role in ensuring that the education have a significant impact for future generation. This pilot study explains the significance of teachers' competency traits and determines as to what extent the D&T teachers are competent from the three aspects; knowledge, skills, and attitude towards teaching programming in primary school. The result of this pilot study also can help to reveals that there is a significant relationship between the three aspects of competency. The result obtained from this pilot study showed that the items for programming knowledge among D&T teachers had a reliability index of = 0.903, which was a good determining factor for the planned study. The programming skills items among D&T teachers were at = 0.945, which was a great determining factor for the intended study. While the items measuring D&T teachers' attitudes towards programming were at = 0.933, were also a great determining factor for the intended study. As a conclusion, all of the items in sections (b), (c), and (d) can be used in the planned study to identify and investigate the knowledge, skill, and attitude of D&T teachers regarding the teaching of programming in primary schools. By identifying the level of current teachers' competency in programming, researcher can identify and suggest suitable professional development need by in-service D& teachers in order to improve teachers' competency in this programming. Continuous training and extensive professional development involving technical skills and comprehension of appropriate pedagogies need to be provided to D&T teachers (Muhamad Yusof *et al.,* 2021). Sáez-López *et al.* (2020) stated that in order to be well-prepared programming teachers, they need to improve their knowledge.

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Conflict of Interest

I declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

I confirm sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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