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# Teachers' acceptance of mobile technology use towards innovative teaching in Malaysian secondary schools

**Siti Noor Ismail[1], Mohd Norakmar Omar[2], Yahya Don[1], Yoppy Wahyu Purnomo[3], Muhamad Dzahir Kasa[1]**
[1]School of Education, Universiti Utara Malaysia, Kedah, Malaysia
[2]SMK Tanjong Puteri, Kedah, Malaysia
[3]Faculty of Education, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

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**ABSTRACT**

The integration of mobile technology is not a new thing nowadays. It became increasingly applied after the COVID-19 pandemic hit the world. Teachers need to use mobile technology devices widely to improve teaching effectiveness. This study aimed to explore the elements of teachers' acceptance of mobile technology as a learning alternative. The respondents consisted of 422 teachers in 24 secondary schools around Kedah, Malaysia. The results showed that teachers are impressed to integrate mobile technology based on three dimensions: effort expectancy, hedonic motivation, and habit. This situation reflects teachers' willingness to translate their pedagogical abilities through the medium of technology. It has also recognized that internal motivation and teachers' natural habits are the driving force behind integrating mobile technology as a teaching aid to digital technology. Thus, mobile technology is a trend of daily use and can be utilized as the most advanced pedagogical material to go through learning in the 21st century.



***Corresponding Author:***

Siti Noor Ismail
School of Education, Universiti Utara Malaysia
Sintok, 06010 Bukit Kayu Hitam, Kedah, Malaysia
Email: siti.noor@uum.edu.my

## 1. INTRODUCTION

The current era of education has changed day by day. The presence of information and communication technology (ICT) in the education system has brought new changes to teacher pedagogy and student learning implementation. This technology's development has led to a different dimension where digital teaching methods have replaced conventional approaches [1]. The use of computer devices is no longer foreign and it is even the habit of educators to implement teaching more efficiently. Teachers can also diversify teaching methods through digital resources provided by the ministry and materials obtained online.

ICT development does not stop there because the learning system is now more open and widespread with mobile technology. This device is becoming a trend and is getting a very encouraging response among consumers regardless of age or background. Of course, among the advantages are that this device is light, small, cheap, and can be carried anywhere [2]. Mobile technology is more meaningful than other technologies when used in conjunction with internet facilities. Based on the Malaysian communications and multimedia commission (MCMC), the internet usage rate of Malaysia's population was 88.7% at the end of 2020, an increase of 1.3% compared to 2018 [3]. This organization's study also found that 98.7% of internet users are mobile technology devices, namely smartphones or tablets. This situation gives the impression that mobile technology has excellent potential to style technological learning and more systematic.

Despite the provision of adequate infrastructure, the question arises of how teachers can produce engaging lessons through mobile technology. This case is due to the phenomenon of drastic pedagogical change compared to the conventional approach [4]. Admittedly, traditional methods are more effective when teachers have trouble providing appropriate teaching materials to the learning needs immediately. Teachers' failure to design teaching through technology is due to very low ICT competencies [5]. In simple terms, teachers still lack the readiness and confidence to change the implementation of digital-based teaching. Indirectly, it will invite a low level of mobile technology integration among educators.

However, previous studies have found that teachers' readiness and acceptance in integrating mobile technology is still moderate [6], [7]. Surprisingly, Chiu and Churchill [8] found that some teachers are worried and think that mobile technology will increase their existing workload. The study of Leem and Sung [2] acknowledge that teachers have lack of self-confidence to improve the quality of teaching through the technology. This phenomenon is due to the organization's work environment and culture that less emphasis on the advantages of mobile technology devices in shaping teaching more meaningful to students.

Undoubtedly, some studies prove that teachers are ready to accept mobile technology integration in their teaching methods. For example, Hu *et al*. [9] found that the factors contributing to mobile technology teachers' integration are performance expectancy, facilitating conditions, hedonic motivation, and habit. Some studies touch on factors such as effort expectancy, social influence, and price value that predict the use of technology among teachers for teaching purposes [10]. In this case, the teacher becomes a vital human being in changing the existing culture to a more fun technological approach. Indeed, students will feel more excited when teachers can give total teaching commitment as desired in the national education system.

Previous researchers [11], [12] have different views in stating the factors of teacher acceptance of the use of mobile technology in teaching. This situation also makes the model unified theory of acceptance and use of technology (UTAUT) and the extended of UTAUT (UTAUT2) introduced by Venkatesh, Thong, and Xu [13] still need to investigate with the acceptance of technological environment in current education. Findings may differ due to the constraints faced in addition to the unending pandemic crisis. Based on the problems discussed, it is appropriate to carry out a further study to explore the truth of technological acceptance factors that are determinants of teachers' behaviors intention to use mobile technology in pedagogy.

## 2. RESEARCH METHOD

### 2.1. Participants

This study used a quantitative approach by a cross-sectional survey. A total of 422 teachers from 24 secondary schools around Kedah, Malaysia, were selected as participants. The participant selection method refers to systematic random sampling. Based on participants' distribution, 124 teachers are male (29.4%), while 298 teachers are female (70.6%). Meanwhile, 31 teachers aged 30 years and below (5.0%), 139 teachers aged 31-40 years (32.9%), 170 teachers aged 41-50 years (40.3%), and the remaining 92 teachers were aged 51 years and above (21.8%).

### 2.2. Instrumentation

The instrument used was adapted from UTAUT2 presented by Venkatesh, Thong, and Xu [13]. The original questionnaire was in English language. Thus, the back-translation method has been implemented following the procedures established to adapt to English. Three experts have reviewed this instrument to ensure that each item is suitable for use in the actual study. In other words, this instrument has achieved facial validity and content validity. Thus, 38 items were specified in the study instrument, with each item measured through a 5-point scale ranging from 1 (very low) to 5 (very high).

### 2.3. Data collection and data analysis

The data collection method uses two ways either to visit the schools involved and use the postal order service. As the study location is extensive, visits to selected schools are only for nearby schools. This visit aims to explain the objectives of the implementation of the study in more detail while ensuring that the questionnaire can be collected more quickly. For schools located in remote locations, the postal order method is used to distribute questionnaires. However, a video recording related to the purpose of the study was included and disseminated through WhatsApp to participants with the school administration's consent. The study data were analyzed using PLS-SEM. Before that, the data had to go through two phases: the measurement phase model and the structure model [14]. Typically, the measurement phase of the model is to explore the validity and reliability of the item and each dimension involved in the instrument. This part is crucial because high validity will impact the study results. Next, the structure phase was used to determine the relationship of UTAUT2 dimensions with significant teachers' behavioral intention.

## 3. RESULTS

### 3.1. The level of mobile technology

Based on the descriptive analysis, it was found that mobile technology integration recorded a high level (M=3.66, SD=0.49). All UTAUT2 dimensions also recorded a high level where the hedonic motivation obtained the highest mean (M=3.92; SD=0.61), followed by performance expectancy (M=3.91; SD=0.59), effort expectancy (M=3.70; 0.61), habit (M=3.69; SD=0.59), and facilitating conditions (M=3.62; SD=0.62). There are two lowest dimensions, namely social influence (M=3.48; SD=0.61) and price value (M=3.46; SD=0.67), but both are still high.

### 3.2. The measurement model

The measurement model's evaluation begins by determining convergent validity. Convergent validity is a degree of measurement that measures the indicators used to represent a dimension in the study [15]. Typically, convergent validity is determined through the value of composite reliability (CR) and average variance extracted (AVE). Each model presented must comply with the CR value of more than 0.70, while AVE's value should exceed 0.50 [14]. Meanwhile, each item's loading factor value also exceeds the set minimum level of 0.60. This situation proves that each item presented in UTAUT2 has suitability and is grouped in its respective dimensions. If the loading factor value is less than that value, then item abortion should be considered to ensure the study's higher validity [14]. Findings prove that no item abortion is performed because each item has a factor value that exceeds the value of 0.6. Table 1 shows the findings for evaluating the mobile technology integration measurement model concerning convergent validity.

Next, the determination of discriminant validity is implemented to ensure that each construct in the study is not related to each other or vice versa. According to Fornell and Larcker [15], the outer loading indicator should have a more excellent value than the relationship between other constructions. In other words, the square root value of AVE must be higher than the correlation between the existing construct. From Table 2, it is found that the square root value of AVE (darkened number) is greater than the other correlation values below it. These results indicate that each construct or dimension in the study has met the prescribed discriminant validity requirements.

Table 1. Convergent validity

| Dimension | Cronbach's Alpha | CR (CR>0.7) | AVE (AVE>0.5) |
|---|---|---|---|
| Performance expectancy (PE) | 0.94 | 0.95 | 0.80 |
| Effort expectancy (EE) | 0.96 | 0.97 | 0.86 |
| Social influence (SI) | 0.86 | 0.90 | 0.64 |
| Facilitating conditions (FC) | 0.91 | 0.94 | 0.75 |
| Hedonic motivation (HM) | 0.95 | 0.96 | 0.83 |
| Price value (PV) | 0.93 | 0.94 | 0.77 |
| Habit (HT) | 0.90 | 0.93 | 0.72 |
| Behavioral intention (BI) | 0.92 | 0.95 | 0.86 |

Table 2. Discriminant validity

| | PE | EE | SI | FC | HM | PV | HT | BI |
|---|---|---|---|---|---|---|---|---|
| PE | 0.895 | | | | | | | |
| EE | 0.671 | 0.927 | | | | | | |
| SI | 0.471 | 0.598 | 0.801 | | | | | |
| FC | 0.513 | 0.594 | 0.540 | 0.863 | | | | |
| HM | 0.616 | 0.646 | 0.535 | 0.658 | 0.913 | | | |
| PV | 0.400 | 0.479 | 0.452 | 0.654 | 0.509 | 0.879 | | |
| HT | 0.598 | 0.658 | 0.557 | 0.616 | 0.667 | 0.533 | 0.847 | |
| BI | 0.550 | 0.658 | 0.477 | 0.580 | 0.654 | 0.508 | 0.717 | 0.929 |

### 3.3. The structural model

The model structure is used to determine the research hypothesis more easily in graphical form. This study tested the research hypothesis through the bootstrapping method with 500 samples set by default in the system. This method is more suitable, mainly to ensure that the correlation between dimensions is more accurate and significant. The findings show that three constructs have a significant relationship between UTAUT2 and teachers' behavioural intention to use mobile technology. Figure 1 shows the findings of the analysis of these relationships.

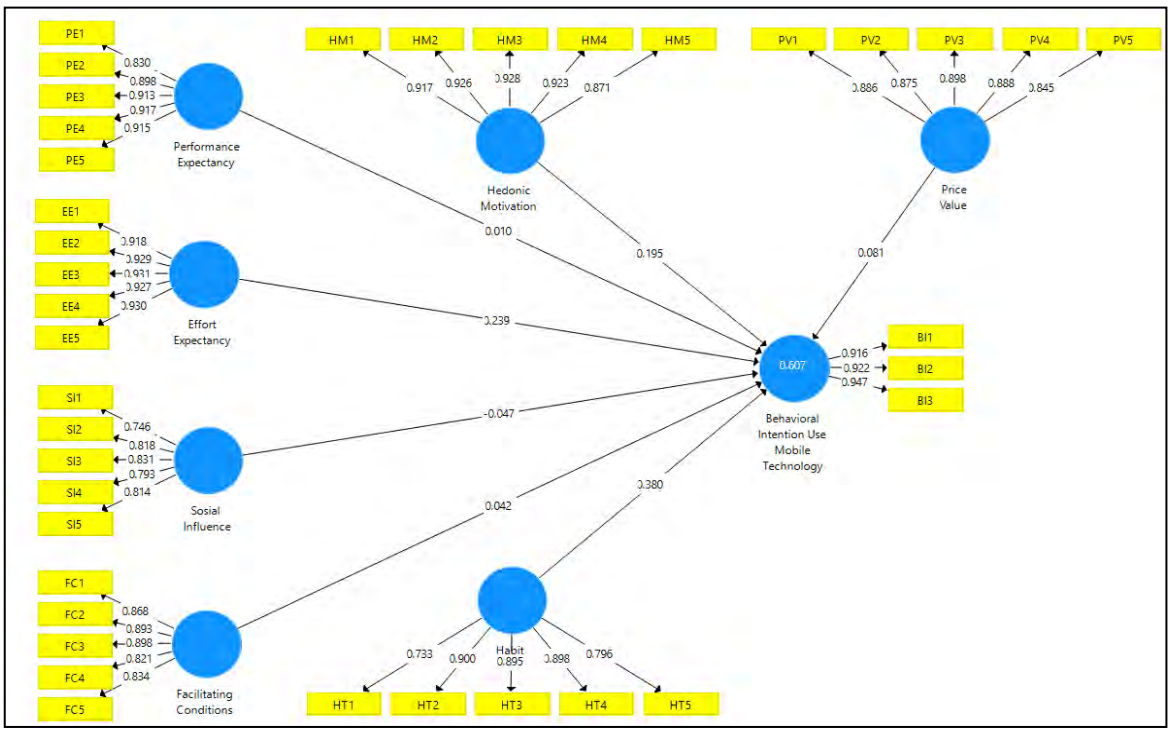


Figure 1. Structural model and path coefficient

As shown in Table 3, the three dimensions of UTAUT2 that are significantly related to teachers' behavioral intention to use mobile technology are effort expectancy (β=0.239, t=3.919, p<0.05), hedonic motivation (β=0.195, t=3.273, p<0.05), and habit (β=0.380, t=6.161, p<0.05). This case indicates that research hypotheses such as Ho2, Ho5, and Ho7 are supported. However, four other UTAUT2 dimensions do not predict a significant relationship to teachers' behavioral intention to use mobile technology when the value is p>0.05. The four dimensions are performance expectancy (β=0.010, t=0.221, p>0.05), social influence (β =-0.047, t=0.960, p>0.05), facilitating conditions (β=0.042, t=0.831, p>0.05), and price value (β=0.081, t=1.945, p>0.05). The findings failed to support the proposed research hypotheses for Ho1, Ho3, Ho4, and Ho6. However, the study's findings have found that the dimensions of UTAUT2 have contributed 60.7% to teachers' behavioral intention to use mobile technology. Research hypotheses of this study are presented in Table 3.

Table 3. Research hypothesis

| | Hypotheses | Relationship | Std. Beta | T-value | P-value | Result |
|---|---|---|---|---|---|---|
| 1. | Ho1 | PE → BI | 0.010 | 0.221 | 0.825 | Not supported |
| 2. | Ho2 | EE → BI | 0.239 | 3.919 | 0.000 | Supported |
| 3. | Ho3 | SI → BI | -0.047 | 0.960 | 0.337 | Not supported |
| 4. | Ho4 | FC → BI | 0.042 | 0.831 | 0.406 | Not supported |
| 5. | Ho5 | HM → BI | 0.195 | 3.273 | 0.001 | Supported |
| 6. | Ho6 | PV → BI | 0.081 | 1.945 | 0.052 | Not supported |
| 7. | Ho7 | HT → BI | 0.380 | 6.161 | 0.000 | Supported |

## 4. DISCUSSION

A significant finding in this study is that teachers' acceptance of mobile technology integration is high. This situation gives the impression that teachers are ready to go through this challenging world of education by applying aspects of technology in teaching. Previously, teachers were accustomed to using technology such as computers or liquid crystal display (LCD) projectors to teach students in computer labs or superior rooms equipped with ICT infrastructure. However, mobile technology devices have given a new dimension that the teaching process can occur anywhere, regardless of the specific location. These findings prove that teachers are willing to accept any changes in the national education system to bring benefits to students and organizations [16].

These findings are in line with Perienen [10], where the UTAUT2 dimensions proposed by Venkatesh, Thong, and Xu [13] have compatibility in determining consumer acceptance of technology integration. Mobile technology is not something new for some individuals because they have used this device regularly in daily life. In this aspect of the study, teachers emphasize that teachers who use mobile technology devices can generate a more meaningful learning process for students. Significantly, teachers' high acceptance of mobile technology will build their readiness to generate a more robust, quality, and high-tech pedagogy [17]. Naturally, building teachers' confidence in accepting technology is more comfortable than expected. Most teachers already have the necessary skills to use devices such as surfing the internet, accessing resources, communicating virtually, and applying other android software [18]. When applied with technological pedagogical content knowledge (TPACK) elements, teachers will quickly adapt their technological skills and translate them more effectively into learning.

In general, performance expectancy predicts that the teaching of teachers using mobile technology is smoother and can increase daily work productivity. Nevertheless, the findings show that the dimension of performance expectancy is not significantly related to teachers' behavioral intention to use mobile technology. These results thus support the findings of previous studies such as Testa and Tawfik [7], which found that teachers' performance failed to be improved at a high level when using mobile technology in teaching. This study also acknowledge that teachers are inconsistent in generating technology-based pedagogy to be less motivated to embody teaching innovation. Organizations such as UNESCO recommend that the proper use of ICT software and devices also help teachers in awakening teachers' ability to use technology [19]. Indeed, ICT competence must feel ready and trained with every application or software used in translating learning objectives [20].

Teachers' convenience using mobile technology devices is a powerful weapon in awakening teachers' ability to translate innovative and technological learning. This statement is true because the findings show that effort expectancy significantly affects teachers' behaviour intention to use mobile technology. According to Al-Mubireek [21], mobile devices can produce a high quality of learning. This situation is because teachers can style various teaching strategies and make mobile technology the most effective teaching aid. Teachers acknowledge that they are more comfortable interacting with mobile technology devices, especially in generating learning that is more difficult to translate through traditional methods [22].

Teachers who frequently use mobile devices will usually have more experience, especially exploring the latest software and applications. This built-in experience is not just to add skills and knowledge in technology, but it is more to produce a positive impact on the learning process [23]. Teachers' ICT competence is not only on the basics, but it can also extend to more advanced technology. Therefore, Kim and Lee [24] recommend that teachers always follow the latest developments from stakeholders, especially introducing new policies related to technology integration. This situation helps teachers explore and deepen new pedagogical sciences and apply them more perfectly through mobile technology devices.

There is no denying that the social environment's influence has little effect on the use of technology among teachers. Based on the study's findings, it was found that the social influence dimension fails to relate significantly to teachers' behavioural intention to use mobile technology. This finding is in line with Thongsri *et al*. [25], where teachers find it quite challenging to get support from several parties, including students and heirs, especially involving mobile learning. In developing countries such as Malaysia, there are still constraints to generate mobile learning holistically due to inadequate internet access facilities and the lack of devices that support the learning concept. Nevertheless, now, the MOE course government has taken productive steps to overcome this problem. Cooperation with the telecommunications sector has resulted in a particular agreement been implemented to channel assistance, such as providing smartphones and internet access to low-income students [26].

After a long time, there are many complaints about the state of ICT facilities provided by the school for teachers' use. In this study, the findings also show that the school's facilitating conditions failed to present a significant relationship with teachers' behavioural intention to use mobile technology in daily teaching. In this case, Omar and Ismail [17] agree that schools' lack of infrastructure makes teachers less motivated to generate technology-based teaching. Weak internet access and lack of technical support is the leading cause of teachers' failure to improve their ability to use mobile technology in schools [11], [27]. This situation seems unfair to educators because their technology's welfare and basic needs are not provided well and correctly. In this study, teachers' constraints to use mobile technology include the lack of educational resources. It is acknowledged that Malay educational resources are tough to obtain online. However, Menon *et al*. [28] suggest that teachers be more creative in producing educational materials digitally on their own.

The use of technology in learning requires a teacher's extreme inner strength. In other words, teachers need to have very high hedonic motivation to generate teaching innovation using mobile technology facilities. This truth is proven when it can show that the dimension of hedonic motivation has a significant relationship with teachers' behavioural intention to use mobile technology. Previously, Bharati and Srikanth

[29] found that hedonic motivation has opened the hearts of educators with a gratifying experience through mobile learning methods. Mobile technology devices are used as much as possible to produce learning involving information sharing, discussion, and communication with each other.

According to Starkey [30], experience in using something related to technology will create a very high internal motivation. Through experience as well, teachers can provide more educational innovations that can positively impact student learning. The more teachers explore and dig for technical knowledge, the more efficient teachers are at handling software involving mobile devices. This situation is critical because teachers' readiness to integrate mobile technology effectively is present through high internal motivational situations [8], [31]. Therefore, mobile technology is an intelligent move significantly to increase productivity and quality of work and create emotions that are always positive from time to time.

Nowadays, a mobile technology device's price is not a burden to all users. This phenomenon is evident when the average user, including teachers, already has at least one mobile device for personal use or performing daily tasks. The findings also show that the price value dimension is not significantly related to teachers' behavioural intention to use mobile technology. This study is in line with El-Masri and Tarhini [32], who found that the device's price is not a question of the factors of teacher acceptance of the implementation of mobile learning. The study involving two countries (United States and Qatar) explained that even teachers in the corners of the world do not have a problem using their own mobile technology devices for learning use.

A meta-analysis study states that the price value dimension is increasingly irrelevant to technological acceptance factors [33]. This situation exists when every user can have their mobile technology device sold at a low price. This mobile technology device is provided free of charge, and telecommunication companies provide internet packages. In Malaysia, the government has collaborated with several telecommunications companies to provide the best devices and internet access to teachers and students to carry out learning activities involving mobile technology [34], [35]. Therefore, teachers should take this opportunity to further improve teaching quality by applying more exciting and enchanting activities.

It is pretty challenging to build a teacher's habit of using technology unless it is already a habit. The study's findings found that the habit dimension has a significant relationship with teachers' behavioural intention to use mobile technology. This situation illustrates that a positive habit will arouse users' interest and ability to improve technological competencies, especially performing multitasking work [36]. Meanwhile, Bharati and Srikanth [29] found that educators who use technology will translate their teaching strategies online, primarily through educational portals such as Moodle. A positive habit will also inspire teachers to be proactive in designing quality teaching using mobile technology devices.

Turning to the current issue, learning during the pandemic is very painful if neither teachers nor students can adopt mobile technology. This attitude must be changed so that the learning journey can go smoothly. However, Hu *et al*. [9] explained that a positive habit results from the experience of using mobile technology devices regularly. In a simple sense, for teachers who often use mobile technology is undoubtedly easier to translate the concept of mobile learning in every teaching activity. This positive use of mobile technology should not only exist in a teacher but should be applied deeply to the whole student [24]. Indeed, technological learning's effectiveness will only result when both teachers and students change attitudes and move actively during the learning process.

## 5. CONCLUSION

Mobile technology is common to educators as well as all communities in general. However, the advantages of the device are more extensive to generate a more dynamic and creative learning process. Therefore, this study has explored the factors that motivate teachers to use mobile technology in the classroom. Based on the dimensions of UTAUT2, it was found that three constructs are significantly related to teachers' behavioral intention to use mobile technology for teaching and learning purposes. These dimensions are effort expectancy, hedonic motivation, and habit. Thus, teachers have the opportunity to style a variety of teaching strategies using mobile technology devices without being tied to location, time, and even static resources only.

The most crucial finding in this study is that mobile technology integration among secondary school teachers is high as a whole. This situation means teachers have high readiness and can use the advantages of mobile technology devices in any situation. Given that the COVID-19 pandemic now plagues the world, it is appropriate for teachers to be prepared with various skills and knowledge to be more organized. Therefore, it is suggested that teachers improve their ICT competencies from time to time by focusing on current educational needs. Skills and knowledge of online platforms such as YouTube, Facebook, Google Classroom, and educational portals are a must. Thus, the use of mobile technology is an effective initiative for teachers to approach existing technology resources more efficiently and flexibly at any time.

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## BIOGRAPHIES OF AUTHORS

**Siti Noor Ismail** is an Associate Professor and Head of Department at the School of Education, Universiti Utara Malaysia (UUM). She has experienced more than 17 years in the education sector. She teaches courses in Strategic Management in Education, Quality Management in Education, and Creativity in Management for Effective Schools. Her research interest includes teacher education, school leadership, and school management and supervision. She can be contacted at email: siti.noor@uum.edu.my.

**Mohd Norakmar Omar** is a PhD graduate from Universiti Utara Malaysia (UUM). He is currently a Mathematics teacher at SMK Tanjong Puteri, Kuala Ketil, Kedah. He has 12 years of teaching experience in secondary school. His research is related to school leadership, ICT, and the adoption of mobile technology. Currently, he is conducting action research involving teachers' teaching and learning in the context of secondary schools. He can be contacted at email: mohdnorakmar@gmail.com.

**Yahya Don** is an Associate Professor and Dean at the School of Education, Universiti Utara Malaysia (UUM). He has experienced more than 30 years in the education sector. He teaches Leadership in Education, Principalship and School Management, and School Management and Supervision courses. His research interest includes teacher education, school leadership, and instructional leadership and supervision. He can be contacted at email: d.yahya@uum.edu.my.

**Yoppy Wahyu Purnomo** is a lecturer at the Faculty of Education, Universitas Negeri Yogyakarta, Indonesia. He teaches courses in Research Methodology, Issues in Educational Research, Write and Publish Scientific Papers, and Mathematics Learning Development in Elementary Grade. His research interests include teacher education and development, scale development study, psychology of mathematics education, textbook research, and mathematics development in elementary grade. He can be contacted at email: yoppy.wahyu@uny.ac.id.

**Muhamad Dzahir Kasa** is a Programme Coordinator of Bachelor Program (Counseling, Guidance and Moral Education) and a lecturer at the School of Education, Universiti Utara Malaysia (UUM). He teaches Statistic in Education, Moral Development and Values, Ethics and Moral Education, and Moral Psychology. His research interest includes ethics, values, moral psychology, moral competence, and moral decisions in management. He can be contacted at email: m.dzahir@uum.edu.my.