Profiling Expert Teacher for Malaysia Education System

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ABSTRACT

This study aims identify and develop expert teachers profiling system for Malaysia Ministry of Education. The whole study used the design and development research (DDR) method. However, this paper discussed only the second research phase which is the design phase. This phase employed a classical Delphi method to identify the criteria and attribute of expert teacher. Meanwhile, focus group discussion (FGD) employed to develop a model for the profiling system. A panel of 15 experts gave their consensus in determining the criteria and the attribute of the expert teachers in three rounds of Delphi. Based on three main themes (knowledge, skills and attitude), the analysis resulted in 12 criteria and 45 specific attributes of expert teachers based on the panel of expert opinions. Then, a FGD was held among 10 information technology experts to develop the profiling system model based on the existing Ministry of Education database. The experts identified five existing database that can supply data to the profiling system. This study explores new possibilities of effective knowledge management for the education ministry in identifying and developing expert teachers. The system model will help the education ministry to make use all the data from relevant database for a meaningful usage. Furthermore, this system transformation will help the education ministry in identifying the future expert teacher earlier from the database, developed their capability to become expert teachers and increase the quality of education in Malaysia.

Keywords: Expert teacher, Knowledge management, Delphi method, focus group discussion, quality education.

INTRODUCTION

The main driver in the quality of education is the quality of the teachers who implement it (Harris & Sass, 2011). There may be slight differences in the approach to teacher training in each country, but systematic and standardized teacher development occurs throughout the career. Teacher professional development needs to be improved for skills, career development, and long-term retention (Darling-Hammond, 2017; Eros, 2011). This allows novice teachers and expert teachers to be identified through the difference in the quality of their expertise components (Moon et al., 2013). Teacher expertise can be defined as a characteristic shown by a teacher who has achieved a high level of performance in their profession (Raduan & Na, 2020). However, not all teachers with extensive experience in their teaching field will reach the level of expert teachers. Furthermore, expert knowledge always needs to be restructured from the unification of different knowledge representations obtained through experience and reflection (Tsui, 2009).

Expert teacher

An expert teacher, often referred to as a master educator, is a highly skilled and experienced professional who excels in the art and science of teaching. Expert teachers go beyond the basics of delivering curriculum content; they possess a deep understanding of pedagogy, are adept at fostering student engagement and learning, and consistently demonstrate a commitment to their students' growth and development (Anderson & Taner, 2023). Expert teachers play a crucial role in the education system for several reasons. Their effective teaching methods positively impact student achievement, leading to better academic outcomes and lifelong learning skills (Tsui, 2009). Expert teachers drive innovation in education, adapting to changing educational landscapes and incorporating new technologies and methodologies into their classrooms (Supramaniam et al., 2020). These teachers inspire students to become lifelong learners and responsible, active members of society, helping shape future leaders and citizens (Orland-Barak &Yinon, 2005). Expert teachers contribute to the professional development of their peers by sharing best practices, mentoring new teachers, and participating in collaborative learning communities (Ismail et al., 2020; Natale et al., 2013; Qian & Walker, 2021). In conclusion, an expert

teacher is not merely a conveyor of information but a dedicated professional who possesses a unique blend of subject expertise, pedagogical skills, empathy, and a commitment to student growth. Their role in education is indispensable, shaping the minds and futures of countless students and contributing to the advancement of society through knowledge dissemination and character development.

The characteristics of expert teachers

There are a lot of criteria to define an expert teacher. Those include a high level of competence and flexibility, insight and sensitivity; a broad knowledge base; and an in-depth interpretation of the problem as identified by Berliner (2001). Previous studies highlight various components of expertise, but in general, they include experience (Herling, 2000; Moon et al., 2013), competence (Herling, 2000; Billet, 2001; Kinchin & Cabot, 2010), connectedness, coherence and comprehensive knowledge (Hattie, 2003; Tsui, 2009). Therefore, expert teachers are usually recognized for their expertise and are assigned as advisors or mentors for new teachers (Orland-Barak & Yinon 2005). The knowledge that makes up a teacher's expertise can generally be categorized into theoretical, practical, and self-regulation knowledge (Tynjälä 2008; Baartman & de Bruijn 2011; Elvira et al., 2017). In addition, expertise can also include knowledge about oneself (Fernandez, 2014), knowledge about teaching and a teacher's experience or learning (Reuker, 2017), or other previous knowledge that can influence the domain of knowledge (Meyer, 2004). Knowledge, experience, and reflection enable teachers to perform tasks more efficiently, quickly understand what has happened, detect misunderstandings, and know how to deal with them (Adie et al., 2020). Thus, the process of identifying a teacher's expertise is complex because it involves various aspects of attitude, knowledge, and skills.

Profiling system

A profiling system, often referred to as a profiling tool or software, is a valuable tool used in various fields to analyze, categorize, and understand data, individuals, or entities based on specific characteristics, traits, or patterns (Kim et al., 2006). Profiling systems typically employ a combination of data analysis techniques, statistical methods, and machine learning algorithms to gather and process data to create profiles or patterns. These profiles can be used to make predictions, identify anomalies, or generate insights about the subject being profiled. One of the advantages of a profiling system is efficiency (Andres & Lanvin, 2014). Profiling systems can process vast amounts of data quickly, making them invaluable for tasks that would be impractical or time-consuming for humans to perform manually. Scalability is the other advantage (Pervin et al., 2013). Profiling systems can adapt to handle large datasets and complex scenarios, making them versatile tools for various applications. On the other hand, profiling systems maintain a consistent approach in their analysis, eliminating the potential for bias or fatigue that humans may experience (Godoy & Amandi, 2006)

Dynamic changes in scientific knowledge have posed significant challenges to expert profiling. Expert profiling plays an important role in expert finding for collaborative innovation in research social networking platforms. Current approaches mostly rely on the knowledge of other experts, the contents of static web pages, or their behavior and thus overlook the insight of big data generated through multiple systems in big organizations (Silva & Ma, 2017). Developing a system to profile expert teachers involves a comprehensive approach that combines data collection, analysis, and the identification of key characteristics and attributes that define an expert teacher. Such a system can be valuable for educational institutions to recognize and support their exceptional educators.

Problem statement

The Education Specialist Field Path is one of the teacher's career paths concerning the Career Development of Field Specialist Path introduced by the Ministry of Education (MoE), Malaysia in 2016. This initiative was published through Shift 4: Transforming the Teaching Profession into a Preferred Profession in Malaysia Education Blueprint 2013-2025, which endorsed seven areas of expertise. Nonetheless, only four main areas of expertise were identified, while several other areas of expertise need to be re-identified (Education Performance and Delivery Unit Report, 2017). The ministry needs a more systematic method in identifying and establishing an expert teachers' database to improve the quality of education in Malaysia.

Therefore, identifying and profiling the expert teachers plays an important role in the search for collaborative innovation in building an expertise network platform (Silva & Ma, 2017). However, Raduan and Na (2020)

found that there are still weaknesses in the teacher expertise profiling system in MoE. The dynamics of change in scientific knowledge have posed a major challenge to the expert profiling process. Despite storing a very large amount of teachers' data in the database, the process of identifying expert teachers is still done manually by the District Education Office and State Education Department in the Malaysia Ministry of Education. This is unsystematic and a waste of investment in data storage. In addition, potential expert teachers also fail to be identified earlier. Therefore, this study will explore the characteristics of expert teachers and propose a system model to profile the expert teachers to support the development and expansion of teacher expertise in Malaysia. This article will i) delve into the attributes of expert teachers and, ii) how the MoE can develop the expert teachers' database based on the existing database.

RESEARCH METHODOLOGY

Research Design

The whole research used a design and developmental research (DDR) approach with three phases - need analysis, design and development, and evaluation, adapted from the DDR model of Richey and Klein (2007). However, this paper discussed only the second phase which is the design and developmental phase. The classical Delphi method was used in this phase to identify the attributes of expert teachers based on a panel of experts' recommendations (Dalkey & Helmer, 1963) and then design the model for expert teachers' profiling system. The process of getting experts' consensus in this study used a three-round Delphi method as suggested by Manizade and Mason (2011) to get sufficient data to meet the needs of the study and the consensus had been reached among the experts. The first round started with qualitative data collection through interviews as suggested by Hasson et al. (2000). In the next round, the same experts evaluate the list of expert teachers' attributes that have been prepared from the analyzed data in the first round. They can add extra attributes to the list or eliminate some of the attributes that they think are not suitable. In the last round, the experts can only give their agreement to each attribute stated in the list on a scale of 0 (strongly disagree) to 5 (strongly agree). At the end of this phase, a focus group discussion (FGD) was held between ten IT experts to discuss and give their opinion on how the existing MoE system could supply the data to the newly developed database and where the new database should be put in the system.

Participants

Respondents for the design phase were two sets of participants selected using the purposive sampling method to get sufficient and satisfactory data for this phase of the study. The first set of participants is a panel of experts consisting of 15 experienced teachers who are involved in the three rounds of Delphi. Fifteen participants were considered enough as the sample size for the Delphi method ranged from 4 to 171 experts (Skulmoski et al., 2007). They were selected based on stringent criteria such as having been teaching the same subject for more than 20 years, being well-versed with all the MoE systems, and being referred by their peers as expert teacher. Another set of participants was selected also using purposing sampling but with different criteria. There were 10 information technology (IT) officers who worked with the Education District Office, State Education Department, or Ministry of Education with their first degree in information technology or information management with at least five years of working experience. Krueger & Casey (2008) suggested the ideal size for a focus group is 8 to 10 subjects. These participants were involved in focus group discussions.

Instruments and Procedures

Research instruments

Design and developmental phase employed a classical Delhi method which starts with an interview with the experts, therefore the interview protocol was used in the first round. The interview protocol consisted only one question 1) In your opinion, who are the expert teachers? The interview protocol was validated by a pilot interview with three experts to ensure the clarity of the proposed question. Bryman (2012) stated that even slight variations in the wording of questions could result in very different answers. The first round of Delphi collected qualitative data from interviews, therefore to ensure the reliability of the instrument and avoiding the bias in transcribing the data, few steps were taken. The data were cross-coded by three different persons, then it was sent back to the interviewee for validation. In the subsequent round of Delphi, a list of expert teachers' attributes

was developed from the interview data analyzed from the experts' recommendations in the previous round. The participants gave their responses on a scale of strongly disagree (0) to strongly agree (5). Subsequently, in the focus group discussion (FGD), the protocol included the rulings of the discussion. The moderators produced one main question on how MoE can develop the database. There are three sub-questions: 1) what is the existing MoE system that can supply data for the database? 2) How can the MoE develop the expert teachers' database from the existing database? and, 3) Where to station the ETPS? Participants in the FGD discuss their opinions and present their conclusions.

Data collection procedures

All the experienced teachers involved in this phase were contacted to ask for their consent to be on the panel of experts in this study. A letter of appointment, a letter of agreement to become the participants along with the terms of reference will be given to them upon their agreement to be involved in this study. Later, each participant was contacted again to set an appointment for an interview. After the interview process with all the participants completed, the data were analyzed and a list of attributes was constructed based on the analysis of the first round of Delphi. The second round of data collection used the list that had been obtained from the first round. The participants can suggest to add or eliminate some of the listed attributes. This round allowed participants to give their views without being biased or leaning toward the opinions of others. The data from this round were analyzed and brought to the next round. In the next round, participants were only allowed to express their agreement to each item in the list. In this final round, attributes that received medium or no consensus among participants will be eliminated. Finally, in the development phase, all ten IT experts were gathered to discuss how can the MoE develop the expert teachers' database from the existing systems.

Data Analysis

Data is analyzed using several statistical methods that are appropriate to the objective and phase of the study. In the design and development phase involving the use of the three-round Delphi method, the interview data in the first round of Delphi was analyzed using thematic analysis to develop themes and subthemes from the data. Then, qualitative data analysis methods such as reducing, organizing, categorizing, and coding the data to identify expert teacher attributes based of the subthemes. This process produces a list of expert teacher attributes to be brought to the second round. In the second and third rounds, the data was analyzed using the descriptive statistical method which is Inter Quartile Range (IQR) to determine the level of consensus between experts. The level of expert consensus on items was determined as high (IQR= 0.00 to 1.00), medium (IQR= 1.01 to 1.99), and no consensus (IQR≥ 2.00). In the focus group discussion, the discussion was moderated by a moderator to facilitate the process. The result of the discussion was analyzed and reported in a form of diagram.

RESULTS

Who are the expert teachers?

The results from the interviews in the first round of the Delphi technique yielded three main themes, which are knowledge, skill and attitude (KSA) and 12 main criteria for expert teacher. Figure 1 shows the conceptual diagram of analysis result of the three main theme and 12 criteria.

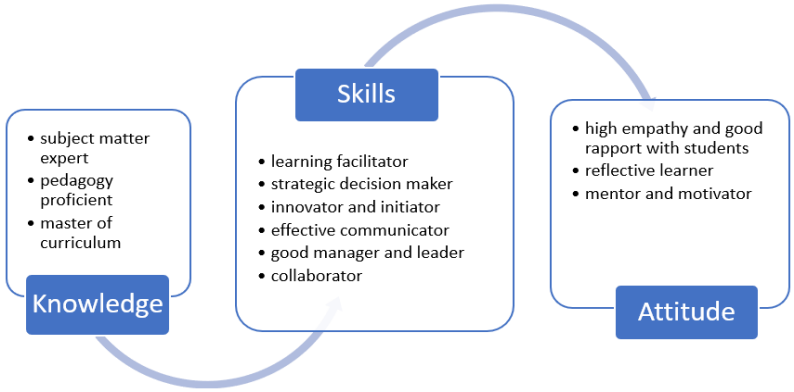

Figure 1. Conceptual diagram of three main themes and 12 criteria of expert teacher

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Figure 1 explained that an expert teacher should be a subject matter expert, pedagogy proficient and master of curriculum. Meanwhile, he/she should possess skills of a learning facilitator, strategic decision maker, effective communicator, a collaborator, an innovator and initiator and also a good manager and leader. Subsequently, he/she should have attitude as a mentor and motivator, high empathy and good rapport with students and be a reflective learner.

Further analysis resulted with 15 attributes from three criteria in Knowledge theme. Table 1 shows the result from the completed classic Delphi method for Knowledge.

Table 1. Criteria and attributes of expert teachers for Knowledge

Main themes	Criteria	Attribute	IQR (2nd round)	IQR (3rd round)
KNOWLEDGE	Subject Matter Expert	have a comprehensive and in-depth knowledge of the subject matter they teach	0.00	0.00
		stay updated with the latest developments in their field	0.00	0.00
		can effectively convey complex concepts to students	0.10	0.00
		have well-developed pedagogical content knowledge	0.00	0.00
		knowledge about their students' ability for the subject	0.22	0.00
		developing and refining teaching materials.	0.00	0.00
		align learning objectives with real-world applications	0.11	0.00
	Pedagogy proficient	well-versed in various teaching methods and strategies	0.00	0.00
		can adapt their instructional approaches to suit the needs and learning styles of their students.	0.00	0.00
		display flexibility in the classroom,	0.00	0.00
		build strong interpersonal relationships with students	0.13	0.00
		engage with students through various choices of activities and contents	0.00	0.00
		emphasized in both constructivist and learner-centered education	0.00	0.00
	Master of Curriculum	Public exam questions' paper developer	0.25	0.14
		Public exam questions' paper examiner	0.17	0.06

Results from Table 1 showed that in the third round, the interquartile range (IQR) ranged from 0.00 to 0.14 which means that all the attributes had a high level of consensus among expert panels.

Analysis for Skills theme resulted in 17 attributes from six criteria of expert teacher. Three more attributes were suggested in the second round of Delphi, summing up to 20 attributes. Table 2 shows the result from the completed classic Delphi method for Skills.

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Table 2. Criteria and attributes of expert teachers for Skills.

Main themes	Criteria	Attribute	IQR (2nd round)	IQR (3rd round)
SKILLS	Learning Facilitator	guide and support students in their learning journey	0.00	0.00
		create a conducive learning environment	0.00	0.00
		continuous learners throughout their careers	0.00	0.00
		encourages critical thinking	0.00	0.00
		encourages problem-solving (Added in 2nd round)		0.10
		encourages independent learning (Added in 2nd round)		0.05
	Strategic Decision Maker	use data and assessments to evaluate student progress	0.20	0.11
		adjust their teaching strategies according to the student progress	0.00	0.00
		identify areas of improvement and tailor instruction to meet individual student needs.	0.00	0.00
	Innovator and Initiator	open to new teaching techniques, technologies, and educational trends.	0.00	0.00
		continuously seek ways to improve their teaching methods and engage students in innovative ways	0.00	0.00
		initiate program/task to solve teaching and learning problems (Added in 2nd round)		0.11
	Effective Communicator	able to explain ideas clearly	0.00	0.00
		listen actively to students	0.00	0.00
		provide constructive feedback to facilitate learning	0.00	0.00
	Good Manager and Leader	practice good time management	0.20	0.12
		show high emotional intelligence	0.00	0.00
		able to lead other teachers	0.00	0.00
	Collaborator	collaborate with colleagues, parents, and other stakeholders to create a supportive educational community	0.23	0.18
		recognize the value of teamwork in fostering student success.	0.00	0.00

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Results from Table 2 showed that in the third round, the IQR ranged from 0.00 to 0.18 which means that all the attributes had a high level of consensus among expert panels.

Analysis for the theme of Attitude resulted in 10 attributes from three criteria of expert teacher. Table 3 shows the result from the completed classic Delphi method for Attitude.

Table 3. Criteria and attributes of expert teachers for Attitude.

Main themes	Criteria	Attribute	IQR (2nd round)	IQR (3rd round)
ATTITUDE	High Empathy and Good Rapport	build strong relationships with students	0.28	0.05
		demonstrate genuine care for their students' well-being	0.20	0.00
		approachable - creating a positive and inclusive classroom environment.	0.00	0.00
	Reflective Learner	engage in self-reflection and assessment of their teaching practices	0.00	0.00
		reflect extensively and critically on their practice	0.13	0.09
		open to feedback and are committed to ongoing professional development	0.25	0.00
	Mentor and Motivator	serve as positive role models for their students.	0.00	0.00
		serve as mentors for their colleagues	0.15	0.00
		help their colleagues frequently	0.32	0.28
		inspire and motivate students to strive for excellence	0.00	0.00

Results from Table 3 showed that in the third round, the IQR ranged from 0.00 to 0.28 which means that all the attributes had a high level of consensus among expert panels.

Result of analysis showed that the Delphi panel of expert agreed on 12 criteria and 45 attributes of expert teacher.

How can the education ministry develop the expert teachers' database from the existing system database?

Designing a profiling system database would depend on the specific requirements and features to include in the system. All the IT experts discussed this matter and suggested that all the systems should be interlinked to develop the database. The IT experts suggested an Entity-Relationship Diagram (ERD) for a profiling system database. This example includes entities like User, Profile, Skills, Education, and Training with relationships capturing associations between them. Five possible systems database that can supply the subjected data to develop a database in the other system (main system). The first database is SPLKPM (Ministry of Education Training Management System). This system can provide a large amount of data to the expert teachers' database. This database can supply data about individual teacher in training, research, mentoring, innovation, professional learning community activities, and other contributions throughout the year during their service. The second database is e-LNPT (Annual Performance Assessment Report). This system used to store data about teacher current year's activities and achievements. The data accumulated through years of service. The third database is EMIS Online (Education Management Information System). This database can provide the teaching experience

data and years of teaching for certain subject. The data can be used to identify the subject matter expert by their teaching experience. The fourth database is Ministry of Education Integrated System (MOEIS). MOEIS is a platform that includes various modules for education management, students, teachers, institutions, and assessments. Through MOEIS, users such as teachers and school administrators can perform various functions, such as filling in examination scores, updating institutional information, and managing student and teacher data. With the availability of MOEIS, all these systems are now integrated into one integrated platform that can be accessed by education personnel through the idMe portal. This allows for more efficient and secure data management and sharing between various systems and users, as well as reducing the need to repeatedly enter the same data in different systems. The main database is Sgmy (Malaysian Teacher System). The Malaysian Teacher System is an online platform developed by the Ministry of Education Malaysia to facilitate the management of data and information related to teachers nationwide. Sgmy is part of the education ministry efforts to modernize the education system and improve teacher management efficiency. From the discussion between the IT experts, they came up with the conclusion that Sgmy system should have another function for searching the expert teachers. Actually, MoE already listed their experts - all the lecturers in teacher training institutions and those who have PhDs in this system - excluded teachers who are subject matter expert and teaching in schools. Therefore, idMe and MOEIS should integrate all the necessary data from SPLKPM, e-LNPT and EMIS. Then, MoE should develop another database in SGMy to extract the expert teacher data from MOEIS. The programmer will set the threshold using fuzzy logic or merit point which will alert the system to pull the data from a certain database to the Expert Teacher Profiling System (ETPS) in the SGMy. The suggested database system flow explained in Diagram 1.

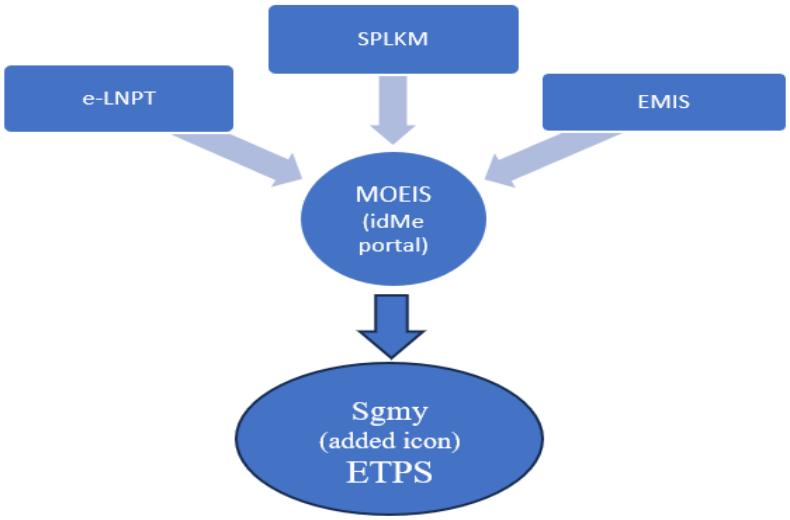

Diagram 1: Suggested the existing MoE database system as the data provider for ETPS

The experts agreed about certain criteria that cannot be captured by any system such as reflective practitioner, empathy and rapport, effective communicator, mentor and role model, and facilitator of learning. They give suggestions for the element that is related to certain criteria that can be inserted into SPLKPM and e-LNPT.

They also agreed that there are a lot of improvements need to be done to the education ministry system if the database has to be created with such ideal criteria. Nonetheless, a first step should be taken to create the database. This database will provide support for teachers in terms of finding specific expert teachers for mentoring, coaching, knowledge sharing, professional learning, or any other educational purposes. This support system will improve the standard and quality of education in Malaysia.

DISCUSSION

Expert teachers are valuable assets within an education system for several compelling reasons such as mentorship and guidance as suggested by Natale et al. (2013). Expert teachers serve as mentors and role models for their less-experienced colleagues. They can provide guidance, share best practices, and help new teachers navigate the challenges of the profession. Hence, they help teachers for continuous improvement as proposed by Ismail,

Ishak and Kamaruddin (2020). Expert teachers often engage in ongoing professional development and reflective practice. Expert teachers can lead professional development workshops and training sessions for their peers. They can share their expertise and help colleagues grow in their teaching practice. Their presence encourages a culture of continuous improvement within the teaching staff, leading to better educational outcomes where it enhances teaching quality as supported by Qian and Walker (2021). Expert teachers bring a wealth of knowledge and experience to the classroom. Their effective teaching strategies and methods can positively impact student learning, contributing to higher academic achievement (Anderson & Taner, 2023).

Furthermore, expert teachers are often at the forefront of educational innovation. They can introduce new teaching techniques, technologies, and approaches that keep the educational system current and relevant (Supramaniam et al., 2020). In schools with a diverse curriculum, expert teachers can specialize in specific subjects or areas of expertise, ensuring that students receive high-quality instruction in all areas of study. Expert teachers also go beyond their duty of providing emotional support for their students (Orland-Barak &Yinon, 2005). Expert teachers can identify struggling students and provide targeted interventions and support. Their expertise can make a significant difference in helping students overcome academic challenges. In other contexts, expert teachers can take on leadership roles within schools and districts. They can become department heads, curriculum developers, or instructional coaches, contributing to the overall improvement of the educational system (Baartman & de Bruijn 2011; Elvira et al. 2017). Their roles have a positive impact on school culture. The presence of expert teachers can create a positive school culture where high standards, collaboration, and a commitment to excellence are valued and promoted.

A database of expert teachers can help retain talent within the education system. New teachers are more likely to stay in the profession when they have access to mentorship and support from experienced educators. Moreover, this database can help the ministry find experts who can engage in educational research and data analysis, contributing to evidence-based practices and policy development in education. In summary, a database of expert teachers is essential for improving the quality of education, supporting professional growth, and fostering a culture of continuous improvement within the education system. These experienced educators play a vital role in enhancing teaching and learning, benefiting both students and the broader educational community.

CONCLUSION AND RECOMMENDATIONS

This study identified 12 criteria of expert teacher which are classified in three themes. Expert teacher is the one who have the knowledge of a subject matter expert, pedagogy proficient and master of curriculum. He/She should have the skills of a learning facilitator, strategic decision maker, innovator and initiator, effective communicator, good manager and leader and a collaborator. He/She should possess the attitude of high empathy and good rapport with students, reflective learner and also a good mentor and motivator. Furthermore, this study also confirmed 45 attributes within the criteria. The IT experts identified five existing database that can supply data to the profiling system database. This study explores new possibilities of effective knowledge management for the education ministry in identifying and developing expert teachers. The system model will help the education ministry to make use all the data from relevant database for effective and justified usage. Furthermore, this system transformation will help the education ministry in identifying the future expert teacher earlier from the database, developed their capability to become expert teachers and increase the quality of education in Malaysia.

While the study is robust, it has several limitations. The findings are specific to Malaysia, which limit their applicability to other context or other countries. Some attributes (such as in the master of curriculum criteria) may not be relevant to countries which do not have public examinations. Besides, the sample size is relatively small. Though it is adequate for a Delphi study, it potentially affecting generalizability considering the heterogeneity of teachers in some other countries which do not have a centralized education system. Due to the unexplored implications for global education systems, we recommend future studies in other countries or with a larger sample size or with more diverse groups. This suggestion intends to expand the body of knowledge and provide deeper insight into broader educational impact supposedly for an informed decision making and meaningful application of the proposed system for educational policymakers and stakeholders beyond Malaysia.

Additionally, there are some issues in considering integrating qualitative insights in measuring the reflective

practices and empathy indirectly within the profiling systems. This study does not explore how it can be done through the system. Thus, we proposed further study in finding what input might be inserted into the system to make it applicable to assess reflective practices, empathy, good rapport and other attitudes which cannot be measured directly using the system. The system database may not be able to capture everything, however it is better than not to have one at all.

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