

# A Proposed Professional Learning Communities Model for Malaysian Schools: Using a Design Development Research Method

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School-based professional learning communities (PLCs) have been one of the strategies of professional development in schools that have proven to impact teachers' quality and student performance. Most of the PLC models are widely researched in western countries, whereas PLCs in Asian countries are limited. The characteristics of these PLC models are different based on the institutional and cultural context. Therefore, there is a need to understand the concept of PLC practices, by developing a PLC model based on the Malaysian institutional context. In this paper we described the design development research method, which includes 4 major phases: literature review, design and development, implementation and finally validation of the proposed model.

**Keywords:** *Fuzzy Delphi method, Malaysia, Professional learning communities, Professional development, School.*

## Introduction

Reforms for school improvement through the professional learning community (PLC) are a priority in current international academic systems. This wave of reforms is the result of worldwide educational competition to supply excellent education. Establishing international standards of quality education, such as the Program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), have also had a significant impact on a country's educational structure (Pang & Wang, 2016). A country that meets these international standards, is said to have the best education systems, policies and practices.

As a result, most of the countries are now seeking evidence from best educational practices beyond their respective national borders (OECD, 2014). The OECD top performers in PISA such as Canada, Singapore, Japan, Australia and South Korea are giving priority in self-professional development in the 21st century and one of the strategies is through PLC (MOE, 2014). This proves that the PLC contributes to the improvement of school systems and practices (Harris, Jones & Huffman, 2018).

Efforts to transform education into more effective school systems are also the Malaysian government's main agenda, to ensure that national education is in line with global trends. To ensure that Malaysia's education does not fall far from the global trends, the Malaysian Education Blueprint (MEB) 2013-2025 was launched in 2012 to transform the country's education system (MOE, 2012). Ongoing professional development such as PLC is one of the ways to improve the quality of teachers and school leaders, and strengthen the teaching profession (MOE, 2014). From 2011 to 2015, a total of 1548 schools implemented the PLC as part of the professional development of teachers (MOE, 2015). In 2016, 64 schools were selected by the MOE to implement the strategy.

As a result, the development and implementation of the PLC has become an important strategy in school reform and the development of teacher professionalism in most countries (Salleh & Dimmock, 2012). Nonetheless, the question is whether the practice model adopted from the west, can have a positive impact on the educational structure in the local context. The basis of model practice in developed countries is not always successful in other countries (Harris, 2011). Thus, only 16 percent of self-professional development was achieved in 2013 (MOE, 2014).

Moreover, MEB 2013-2025 has also targeted 60 percent of self-professional development by the end of the plan (MOE, 2014). Therefore, a study of the development of the PLC practice model that takes into account the local context, culture and language is carried out in accordance with the recommendations of Harris and Jones (2017). Furthermore, the models and instruments generated from this study are expected to be of great benefit to the effective implementation of the PLC in schools, and as a guide for stakeholders in the school education system.

## **Methodology**

The focus of this study is the development of a PLC model for schools. This study uses the design and development research (DDR) approach (Richey & Klein, 2007). DDR is a broad research approach involving a variety of quantitative and qualitative research techniques (Richey & Klein, 2007, 2014). DDR in general focuses on the process of developing a product that involves context and situation analysis, as well as the evaluation of a product (Saedah,



Norlidah, Dorothy & Zaharah, 2013). Products can be in the form of models, techniques, modules or training programs. However, March, Park and Ram (2004), and Ellis and Levy (2008) point out that DDR is an approach that guides a study in (a) creating a new theory for problem solving, (b) designing and developing a new model in different fields of study, (c) developing new methods and processes for implementing existing models or equipment, (d) adapting previous techniques, frameworks and methods which have not been tested in a new context of problem solving. Ellis and Levy (2008) state that DDR involves the identification of research problems, based on research highlights and the contribution of knowledge. The two types of DDR studies (Saedah et al., 2013; Richey & Klein, 2005, 2007) are:

**Type 1:** Specific product development studies or programs that involve design, development and evaluation processes. A specific teaching model design such as the ADDIE and the ASSURE model as a guide to process development.

**Type 2:** Studies focusing on the generation of new knowledge in terms of model development. Knowledge in the form of new designs or techniques, evaluated through a formative way or a complete model development process, involving one or more phases of design and development studies.

The explanations of these types are shown in Table 1.

**Table 1:** Two types of DDR research

<b>Product and Tool Research (Type 1)</b>	<b>Model Research (Type 2)</b>
Design and development comprehensive project <ul style="list-style-type: none"> <li>• Product and instructional program</li> <li>• Other instructional product and program</li> </ul>	Model Development <ul style="list-style-type: none"> <li>• Comprehensive model development</li> <li>• Component model development process</li> </ul>
Specific project phase <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Design</li> <li>• Development</li> <li>• Assessment</li> </ul>	Model validation <ul style="list-style-type: none"> <li>• Internal component model validation</li> <li>• External impact model validation</li> </ul>
Development tool <ul style="list-style-type: none"> <li>• Developmental tool</li> <li>• Tool usability</li> </ul>	Model usability <ul style="list-style-type: none"> <li>• Research on condition impacted the usability of the model</li> <li>• Decision-making research</li> <li>• Research on characteristics and expertise</li> </ul>
Emphasise Research on specific product or development and assessment project	Design and development research, assessment or model usability
Outcome/ Output Learning from specific products and analysis of the conditions for better usability. Specific conclusion.	Design and development procedure or new model and situation that supports usability. General conclusion.
Research techniques. Various techniques such as case study, survey, qualitative research.	Various techniques such as qualitative research, case study, survey

**Source:** Richey & Klein (2007)

DDR studies are structured and phased (Richey & Klein, 2005) and according to Saedah et al. (2013), the DDR process involves four phases. These phases are; the needs analysis phase, the design phase, the development phase, and the implementation and evaluation phase. Ellis and Levy (2010) proposed six phases of DDR, namely problem solving, explaining objectives, design, and development, testing, evaluation, and reporting of results. However, Richey and Klein (2005) did not specify the number of phases and the DDR process can include specific phases according to the type of study conducted (Richey & Klein, 2005). Therefore, this study applies type two research, which is the model development phase. The four main phases of the

model development are Phase 1: Literature review, Phase 2: Model development, Phase 3: Model implementation and Phase 4: Model validation. In the next section, a description of the method used, sample selection, instrumentation, data collection procedure and data analysis method from the first phase to the fourth phase is discussed. Justification of each method used is also provided.

### ***A. Literature Review Phase***

The first phase of the design is a review of studies over two decades involving the analysis of five models of PLC. This phase aims to identify the dimensions of the PLC to serve as the basis for this study as suggested by Van den Akker, Gravemeijer, McKenney and Nieveen (2006), and Richey and Klein (2005). Ellis and Levy (2008) also suggest the importance of research to identify the needs, interests, and problems of a study. Some examples of DDR studies using a literature review as the first phase technique are discussed in Adamski (1998), Tracey (2002), and Mazidah, Suriyati and Nurulhuda (2018).

The analysis of the literature review is illustrated in Table 2.

**Table 2:** Elements of PLC Models

	<b>Louis et al. (1996)</b>	<b>Hord (1997)</b>	<b>Bolam et al. (2005)</b>	<b>Sleegers et al. (2013)</b>	<b>Zhang &amp; Sun (2018)</b>
<b>Sharing values, visions and missions</b>	Shared norms and values, collective focus on student learning	Shared values and visions	Shared values and visions, collective responsibility for pupils learning	Shared values and vision	Shared purpose and responsibility
<b>Collaborative learning</b>	Collaboration	Collective creativity	Collaboration focused on learning, professional learning, individual and collective	Collective learning, currency, active and reflective construction of knowledge	Informal collaborative learning
<b>Deprivatised practice</b>	Deprivatised practice and reflective dialogue	Shared personal practice	Reflective professional inquiry	Shared practices	Collective inquiry and sharing
<b>School structure and climate</b>	Structural conditions	Supportive conditions	Mutual trust, respect and support, Openness, networks, and partnerships	Resources, structures and systems, Relationships and climate	Organisational structure, collaborative relationship, Institutional barriers, Cultural barriers
<b>School leadership</b>	Human and social resources	Supportive and shared leadership	Leading and managing the PLC, inclusive membership	Stimulating and participative leadership	Supportive leadership

### ***B. Design and Development Phase***

This phase aims to identify the dimensions, elements, and practices of the PLC in schools, based on the views of local experts to develop a model and instruments for the implementation phase. To achieve this aim, this phase uses the Fuzzy Delphi method which is a combination of the Delphi technique and fuzzy set theory (Saido, Siraj, Dewitt & Al-Amedy, 2018).

The Fuzzy Delphi method was introduced by Murray, Pipino, and Gigch (1985). This method is an analytical method for making a decision that incorporates fuzzy theory in the traditional Delphi method. The Delphi method was introduced by the RAND Company in 1953 by Olaf Helmer and Norman Dalkey to solve military problems (Helmer, 1983). Cornish (1977) found this technique to be widely used to predict technology, in education and in other fields. To this day, this technique is used in various fields such as engineering (Sinha, Sarkar & Mandal, 2018), health (Prak & Wivatvanit, 2018), education (Dutt, Tan, Alagumalai & Nair, 2019), tourism (Knowles, 2019) and organisational development (Lyons, Timmons, Cohen-Hall & LeBlois, 2018).

The Delphi technique is a decision-making method that involves several rounds of a survey based on expert opinion to resolve an issue (Linstone & Turoff, 2002). This technique is also called the method of understanding, or understanding the inner view, by a group of experts or the Delphi panel. Adler and Ziglio (1996) state that the Delphi technique, is a structured process for collecting and explaining knowledge from expert panels, through a series of questionnaires with controlled feedback. Some of the features of the Delphi technique are:

1. Anonymity: An expert panel is selected individually and each expert does not know the identity of the panel members. The expert panel only receive feedback from other experts in the second round. The advantage is that the experts will not feel any pressure, influence or encouragement from other experts in providing feedback on the questionnaire.
2. Feedback: Through the round, experts can give ideas in general and give them an opportunity to re-evaluate their views.
3. Statistics: Feedback from each expert is analysed using frequency and arranged chronologically in graph form.
4. Convergence: The results will be determined by converting expert panel feedback after several rounds.

Based on the above features, the Delphi method aims to have expert consensus as the final product. This method not only incorporates expert opinions, but also requires consensus through several rounds of questionnaires (Mullen, 2003). As a result, there are several weaknesses identified through this method (Hanafin, 2004):

1. Multiple study rounds lead to longer study periods.
2. Repeated processes may cause specialists to be frustrated and this may impede data collection. Decreased commitment will affect their coordination and communication. This can affect the arrangement between them.
3. Repeated rounds may be financially costly.
4. Weaknesses in the analysis process cause some expert opinions to be ignored in reaching consensus.

Therefore, this study uses the Fuzzy Delphi technique to overcome the weaknesses in the traditional Delphi method. Additionally, model development using this method is widely used in business, education, technology, and engineering, for example, instructional model construction (Saido et al., 2018), business model acquisition (Kumar et al., 2018) and technology model construction (Lee & Seo, 2016).

The Fuzzy Delphi rounds proposed in this study are based on the method used by Saido et al. (2018). They are as follows:

Round one. Researchers interviewed twelve experts on PLC practices. Interview sessions are recorded with permission from the experts' panel to avoid information leakage. Data is analysed based on the transcriptions from the interview. The data is categorised according to the theme and elements specified. The result of this process is a list of PLC items with a 7-point linguistic scale.

Round two. The participants are given questionnaires that were developed in the first round. The participants are asked to rate each item. Questionnaires can be submitted to the panel either by email, posted or face-to-face for review purposes, at the convenience of the participants (Balasubramaniam & Agarwal, 2012).

The process of data analysis follows and all linguistic scales are converted into fuzzy triangle numbers. The data is analysed using Microsoft Excel software. The threshold value ( $d$ ) will be calculated using the templates built in the software.

The determination of item acceptance is based on three rules (Mohd Ridhuan, Saedah, Zaharah, Nurulrabihah and Ahmad, 2014). The first rule is the value of  $d$  is equal to or less than 0.2 (Cheng & Lin, 2002). The second rule is that the percentage value of the agreement must be greater than, or equal to 75 percent (Chu & Hwang, 2008). The third rule is the alpha-cut value is greater than 0.5. Subsequently, upon reaching consensus among experts, the defuzzification process is performed using a fuzzy evaluation formula to determine the rank of an item.

### ***C. Implementation Phase***

This phase uses a quantitative approach. The researcher has chosen a survey and the main purpose of a survey, is to describe the characteristics of a population, so that the study can be carried out.

The type of survey conducted in this study is a cross-sectional survey. According to Creswell (2002), cross-sectional design involves collecting data on a single sample, from a single study population. Whereas Chua (2011) defines survey studies as non-experimental research by using

the questionnaire to study the subjects.

Therefore, in line with these views, an instrument created from the model development phase is used for data collection. The survey results are used to describe the level and differences in PLC practices amongst teachers in SBT schools.

#### ***D. Model Validation Phase***

The technique for this phase involves data analysis based on the survey conducted in the implementation phase of the model. This phase aims at shaping the model by identifying whether there is a compatibility between the developed model and the data collected. We use Structural Equation Modelling (SEM) to empirically validate our model. SEM is a group of multivariate techniques, that analyse the relationships among the variables consisting of factor analysis and regression. Thus, the analysis using SEM will show our defined model is valid.

#### **Conclusion**

In this paper, we have depicted the methodology used in developing the PLC model. The method was based on Design Development Research (Richey and Klein, 2007). There are four phases to complete the research. A literature review was undertaken in the first phase, to identify the elements of PLC to build the questionnaires for the Fuzzy Delphi method. In the second phase, we built the instrument and a prototype model through the Fuzzy Delphi method. In the third phase, we implemented the model through the survey. Finally, we validated the model using SEM software. It is anticipated that this research will provide guidance for using the DDR method for similar research, and contribute to the field of professional development. The results of this methodology, which is the specifics of the PLC model will be presented as future work.

## REFERENCES

- Adamski, A. J. (1998). *The development of a systems design model for job performance aids: A qualitative developmental study*. (Unpublished Doctoral Thesis). Wayne State University, U.S.A.
- Adler, M., & Ziglio, E. (1996). *Gazing into the oracle: The Delphi method and its application to social policy and public health*. Jessica Kingsley Publishers.
- Balasubramanian, R., & Agarwal, D. (2013). Delphi technique- A review. *International Journal of Public Health Dentistry*, 3(2), 16-25.
- Bolam, R., McMahon, A., Stoll, L., Thomas, S., Wallace, M., Greenwood, A., ... Smith, M. (2005). *Creating and Sustaining Effective Professional Learning Communities*. Research Report 637. London: DfES and University of Bristol.
- Cheng, C. H., & Lin, Y. (2002). Evaluating the best main battle tank using fuzzy decision theory with linguistic criteria evaluation. *European journal of operational research*, 142(1), 174-186.
- Chu, H. C., & Hwang, G. J. (2008). A Delphi-based approach to developing expert systems with the cooperation of multiple experts. *Expert systems with applications*, 34(4), 2826-2840.
- Chua, Y. P. (2011). *Kaedah penyelidikan edisi kedua*. Serdang: McGraw-Hill (Malaysia) Sdn. Bhd.
- Cornish, (1977). *The study of the future*. Washington, D.C.: World Future Society.
- Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative*. Upper Saddle River, NJ: Prentice Hall.
- Dutt, A., Tan, M., Alagumalai, S., & Nair, R. (2019). Development and Validation of the Ability in Behavior Assessment and Interventions for Teachers Using Delphi Technique and Rasch Analysis. *Journal of autism and developmental disorders*, 1-12.
- Ellis, T. J., & Levy, Y. (2008). Framework of problem-based research: A guide for novice researchers on the development of a research-worthy problem. *Informing Science: The International Journal of an Emerging Transdiscipline*, 11, 17-33.
- Hanafin, S. (2004). *Review of literature on the Delphi Technique*. Dublin: Department of Children and Youth Affairs.



- Harris, A. (2011). System improvement through collective capacity building. *Journal of educational administration*, 49(6), 624-636.
- Harris, A., & Jones, M. (2017). Leading educational change and improvement at scale: some inconvenient truths about system performance. *International Journal of Leadership in Education*, 20(5), 632-641.
- Harris, A., Jones, M., & Huffman, J. B. (2018). *Teachers leading educational reform: The power of professional learning communities*. Routledge.
- Helmer, O. (1983). *Looking forward: A guide to future research*. Beverly Hills, CA: Sage.
- Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004) Design Science in Information Systems Research, *MIS Quarterly*, 28 (1), 77-105.
- Hord, S. M. (1997). Professional learning communities: Communities of continuous inquiry and improvement. *Office of Educational Research and Improvement*, 40(1), 58–59.
- Knowles, L.B.N. (2019). Can the North American ski industry attain climate resiliency? A modified Delphi survey on transformations towards sustainable tourism. *Journal of Sustainable Tourism*, 27(3), 380-397.
- Kumar, A., Pal, A., Vohra, A., Gupta, S., Manchanda, S., & Dash, M. K. (2018). Construction of capital procurement decision making model to optimize supplier selection using Fuzzy Delphi and AHP-DEMATEL. *Benchmarking: An International Journal*, 25(5), 1528-1547.
- Lee, S., & Seo, K. K. (2016). A hybrid multi-criteria decision-making model for a cloud service selection problem using BSC, fuzzy Delphi method and fuzzy AHP. *Wireless Personal Communications*, 86(1), 57-75.
- Linstone, H. A., & Turoff, M. (2002). *General applications: introduction. The Delphi approach: Technique and applications*. MA: Addison-Wesley Publishing.
- Louis, K. S., Marks, H. M., & Kruse, S. (1996). Teachers' Professional Community in Restructuring Schools. *American Educational Research Journal*, 33(4), 757–798.
- Lyons, O., Timmons, J., Cohen-Hall, A., & LeBlois, S. (2018). The essential characteristics of successful organizational transformation: Findings from a Delphi panel of experts. *Journal of Vocational Rehabilitation*, 49(2), 205-216.



- Mazidah Mat Rejab, Suriayati Chuprat, & Nurul Huda Firdaus Mohd Azmi. (2018). A Review for Improving Software Change using Traceability Model with Test Effort Estimation. *International Journal of Academic Research in Business and Social Sciences*, 8(4), 1198-1208.
- Ministry of Education Malaysia. (2012). *Malaysia Education Blueprint 2013-2025*.
- Ministry of Education Malaysia. (2014). *Penilaian Bersepadu Pegawai Perkhidmatan Pendidikan*.
- Ministry of Education Malaysia. (2015). *Malaysia Education Blueprint Annual Report 2015*.
- Mohd Ridhuan Mohd Jamil, Saedah Siraj, Zaharah Hussin, Nurulrabihah Mat Noh, & Ahmad Ariffin Sapar. (2014). *Pengenalan asas keadah Fuzzy Delphi dalam penyelidikan rekabentuk pembangunan*. Bangi: Minda Intelek Agency.
- Mullen, P. M. (2003). Delphi: myths and reality. *Journal of health organization and management*, 17(1), 37-52.
- Murray, T. J., Pipino, L. L., & van Gigch, J. P. (1985). A pilot study of fuzzy set modification of Delphi. *Human Systems Management*, 5(1), 76-80.
- Organisation for Economic Co-operation and Development. (2014). *PISA 2012 Results: What Students Know and Can Do. Student Performance in Mathematics, Reading and Science*. OECD Publishing.
- Pang, N. S., & Wang, T. (2016). Professional learning communities : research and practices across six educational systems in the Asia-Pacific region. *Asia Pacific Journal of Education*, 36(2), 193–201.
- Prak, M., & Wivatvanit, S. (2018). The development of neonatal nursing standards of practice for Cambodia: a Delphi study. *Journal of Health Research*, 32(1), 12-23
- Richey, R. C., & Klein, J. D. (2005). Developmental research methods: Creating knowledge from instructional design and development practice. *Journal of Computing in higher Education*, 16(2), 23-38.
- Richey, R. C., & Klein, J. D. (2014). *Design and development research: Methods, strategies, and issues*. Routledge.
- Richey, R., & Klein, J. D. (2007). *Design and Development Research: Methods, Strategies, and Issues*. Lawrence Erlbaum Associates.



- Saedah Siraj, Norlidah Alias, Dorothy DeWitt, & Zaharah Hussin. (2013). *Design and developmental research: Emergent trends in educational research*. Pearson Malaysia.
- Saido, G. A. M., Siraj, S., Dewitt, D., & Al-Amedy, O. S. (2018). Development of an instructional model for higher order thinking in science among secondary school students: a fuzzy Delphi approach. *International Journal of Science Education*, 40(8), 847-866.
- Salleh Hairon, & Dimmock, C. (2012). Singapore schools and professional learning communities: Teacher professional development and school leadership in an Asian hierarchical system. *Educational Review*, 64(4), 405-424.
- Sinha, R. C., Sarkar, S., & Mandal, N. R. (2018). Development of quality indicators for multi-family residential buildings in India-a Delphi analysis. *International Journal of Sustainable Society*, 10(2), 96-122.
- Sleegers, P., den Brok, P., Verbiest, E., Moolenaar, N. M., & Daly, A. J. (2013). Toward conceptual clarity: A multidimensional, multilevel model of professional learning communities in Dutch elementary schools. *The Elementary School Journal*, 114(1), 118-137.
- Tracey, M. W. (2002). *The construction and validation of an instructional design model for incorporating multiple intelligences*. (Tesis Ijazah Doktor Falsafah yang tidak diterbitkan). Wayne State University, U.S.A.
- Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (2006). *Educational design research*. Routledge.
- Zhang, J., & Sun, Y. (2018). Development of a conceptual model for understanding professional learning communities in China: a mixed-method study. *Asia Pacific Education Review*, 19(4), 445-457.