International Journal of Global Optimization and Its Application
Vol. 1, No. 4, December 2022, pp.266-272.

e-ISSN: 2948-4030
https://doi.org/10.56225/ijgoia.v1i4.105

Article

Evaluation of Fundamental Instructional Design Skill: The Quality of PPG Program In-Service Teachers

Ming Foong Lee [1,*], Chee Sern Lai [1] and Azmanirah Ab Rahman [1]

[1] Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400, Malaysia; lcsern@uthm.edu.my (C.S.L), azmanira@uthm.edu.my (A.A.R)
* Correspondence: mflee@uthm.edu.my (M.F.L)

Citations: Lee, M.F., Lai, C.S. & Rahman, A.B. (2022). Evaluation of Fundamental Instructional Design Skill: The Quality of PPG Program In-Service Teachers. *International Journal of Global Optimization and Its Application*, *1*(4), 266-272.

Academic Editor: Muhammad Hafidz Fazli Bin Md Fauadi.

Received: 5 September 2022 Accepted: 26 November 2022 Published: 31 December 2022

Abstract: Program Pensiswazahan Guru (PPG) is a targeted degree program catered for those in-service teachers mention above. PPG is conducted using a distance learning mod and the duration is 4 years. In-service teachers will attend the courses during the weekend and only five times face-to-face meetings with the lecturers. However, there is no comprehensive research has been conducted towards PPG students' mastery skills in fundamental instructional design. Therefore, this study aimed to evaluate the fundamental instructional design skill level among PPG students and to determine the differences in fundamental instructional design skills among three groups of PPG students (Primary School, Secondary School, and Vocational College). This study employed a tracer study survey as the research design by using a set of questionnaires on the Needham Model-based instructional design skill assessment sheet. A total number of 276 respondents were involved in this study. The collected data will be analysed by using descriptive statistics and the One-Way ANOVA Test. Results show that most of the in-service teachers tend to have high scores in fundamental instructional design skills, namely orientation, idea generation, idea restructuring, application of the idea, and reflection. Vocational college teachers were champions in all four phases of instructional design skills except the reflection phase. The reflection phase was championed by teachers from primary school. Meanwhile, secondary school teachers tend to achieve middle level across all instructional design skills. In conclusion, the PPG programme conducted by the university can enhance the in-service teacher's instructional design skills.

Keywords: fundamental instructional design skill; PPG program; in-service teachers; primary school; secondary school; vocational college.

1. Introduction

Many colleges and universities are revamping their education schools to include an emphasis on content knowledge, increased use of educational technologies, creation of professional development schools, and innovative training programs (An & Reigeluth, 2011; Villegas-Reimers, 2003). It aimed at career switchers and students who prefer to earn a degree through part time mode without affecting their

current job. It remains the same for the in-service teachers with diploma qualification to pursue their first degree. Program Pensiswazahan Guru (PPG) is a targeted degree program catered for those in-service teachers mention above. PPG is conducted using distance learning mod and the duration is 4 years. In-service teachers will attend the courses during weekend and only five times face-to-face meeting with the lecturers.

This program is an expansion policy in teacher graduation under the Education Development Plan 2001-2010, which has yet to be fully achieved by the Ministry of Education Malaysia. PPG aims to improve the quality of teaching and school management by increasing the teachers' level of educational qualifications from diploma to degree. Its implementation is based on the results of meetings related to `Strategy Package for Higher Growth and Structural Change: Human Capital for High Income Economy 'on 24 June 2009 between the Economic Planning Unit (EPU) of the Prime Minister's Office (PMO) and the Ministry of Education (MOE). PPG under the RMK-10 by taking into account the recommendations by the EPU as follows:

- Avoid the teacher left the classroom en masse.
- Minimize the negative impact on teaching & learning activities in the classroom.
- Saving the cost that need to be borne by the people.

MOE has taken a wise step when providing the chance to non-graduate teachers either are in primary school or secondary school to pursue their degree certificate. This action is in line with the aspirations of the MOE that targeting 100% of secondary school teachers and 50% of primary school teachers with degree qualification by the end of RMK-10. However, issues were highlighted where teaching competency or performance among in-service teachers are varied during teaching practice observation (Kiggundu & Nayimuli, 2009; Ngidi & Sibaya, 2003). Due to their part-time mode of learning, there are concerns whether their performance is at par with their full-time peers. This research wishes to further investigate whether their competency is at par with full time students in terms of pedagogical knowledge because PPG students are the in-service teacher. Teachers play an important role to design an effective learning environment by using the most suitable teaching approach in order to create a meaning learning process for the students (Kasanda, 1995; Marais & Meier, 2004). The PPG program in UTHM were divided into three categories, which are primary school, secondary school and vocational college.

Therefore, the PPG students' pedagogical knowledge, in other words, fundamental instructional design skill will be evaluated. The fundamental instructional design skill for 21st century where focus on student centered learning can represent by Needham Model. This is a learning model that could to enhance students' understanding in science concept and encourage students to involve themselves in the classroom actively. Needham's Five Phase Constructivism Model consists of the five phases (Nair, 2005): (i). Orientation Phase aims to get attention and interest of students and motivate students for their continued interest in the teaching process. Some examples of activities that can be are to make a demonstration or showing a video. (ii). Generating Ideas phase are teachers identify student's alternative thinking and encourage them to think why they are not consistent with the idea of scientific ideas. Question method that encourages thinking can be carried out by teachers. (iii). Restructuring Ideas phase is information and activities according to their intelligence will be used to help establish student's new concept. Students will be able to make the definitions, explaining concepts, questioning the justification and request further explanation. (iv). Application Idea phase is used to identify newly renovated or constructed in a restructuring phase to apply the idea of the new situation. The concept is built on associate and developed in other fields or in the real world. (v). Reflection Phase assess and evaluate student understanding of the previous ideas have changed. Examples of activities are made by reflective questioning to the students as they question what they think, what evidence you have or what you know about things that matter. The effect on student is to assess whether their students understand and apply what they learned.

Needham model learning approach has its own advantages when applied in the teaching and learning in the classroom. In the process of developing new knowledge, students will think creatively and critically. In addition, it also encourages students to think in solving a problem, generate ideas and make good decisions in the face of the range of possibilities and challenges in learning. This process can be achieved by students through research and investigation as to identify problems, gather information, process data, making interpretations and conclusions made on learning. Students gained an understanding to make them more self-confident and courageous in the face in solving problems in new situations. Students construct their own knowledge, concepts and new ideas actively able to help students improve the understanding of a subject in the face of possibilities and challenges during the teaching and learning process (Perry, 2013). Consequently, students can understand the concepts and ideas when they are directly involved in the

construction of new knowledge. Students understand and apply new knowledge and new situations in life. As a result of understanding a concept, students can build a concept through active involvement in linking new knowledge with existing knowledge received to build new knowledge.

In short, the objectives of this were:

a. To evaluate the fundamental instructional design skill level among the PPG students.
b. To determine the differences of fundamental instructional design skill among three groups of PPG students (Primary School, Secondary School and Vocational College).

2. Materials and Methods

This study was employed tracer study survey as the research design. The researcher reviewed and design the assessment sheet will be prepared to evaluate the fundamental instructional design skill among the PPG students after they completed their PPG programme. Then, a survey was conducted to evaluate PPG students' fundamental instructional design skills from three different categories, primary school, secondary school and vocational college. Upon the completion of data collection, data analyses were executed. The sample for this research involving PPG students from primary school, secondary school and vocational college. The instrument used in this study is a set of questionnaires on Needham Model based instructional design skill assessment sheet (Lee et al., 2020). Sampling technique was applying cluster sampling technique. Targeted sample size for this research is about 100 for each group, and the total sample will be 300. About 450 set questionnaires were distributed to graduates after one year of graduation but only 276 were returned. The collected data will be analyses by using descriptive statistic, and One-Way ANOVA Test. The results were presented in tables and graphs.

3. Result and Discussion

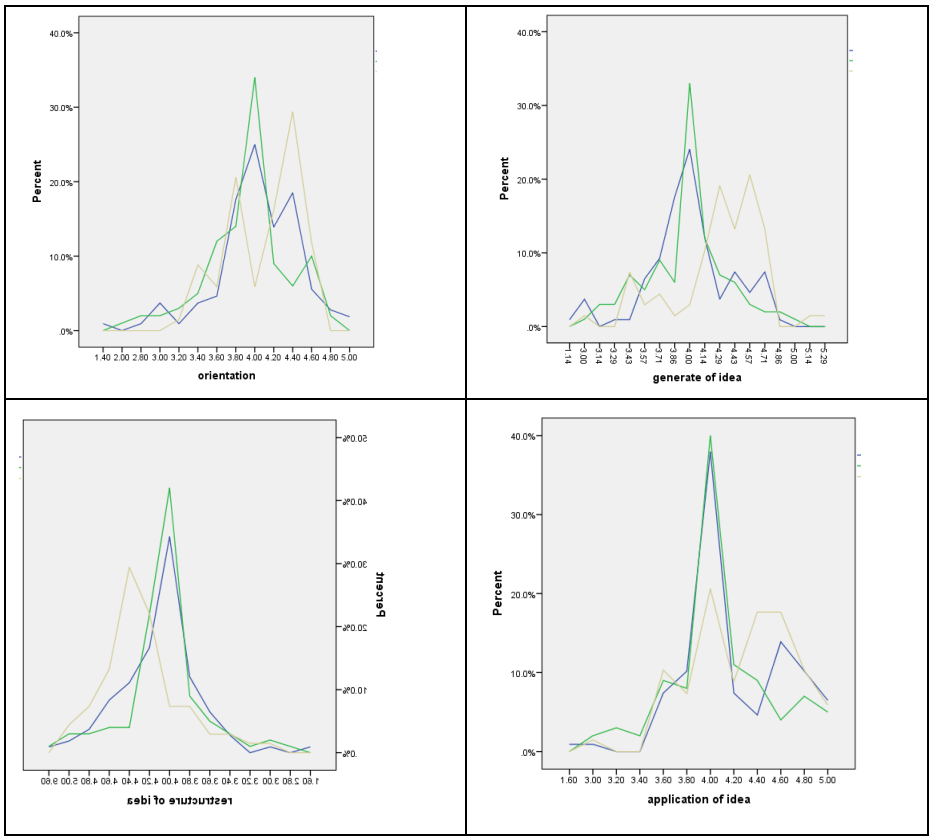
Table 1 shows the descriptive statistics on phases of fundamental instructional design skills according to Needham Model among the three difference groups of PPGs graduated. Results show that Vocational Colleges' teachers tend to have highest score in orientation (M=4.09, SD=0.39) compare to primary schools' teachers (M=4.02, SD=0.49) and Secondary schools' teachers (M=3.92, SD=0.46).

Table 1. Descriptive statistics on phases of Needham Model application among the PPG graduated.

Phases of Needham Model	Groups of PPG	N	Mean	Std. Deviation
Orientation	Primary School	108	4.02	0.49
	Secondary School	100	3.92	0.46
	Vocational College	68	4.09	0.39
	Total	276	4.00	0.46
Generate idea	Primary School	108	3.99	0.47
	Secondary School	100	3.97	0.39
	Vocational College	68	4.29	0.43
	Total	276	4.06	0.45
Restructure idea	Primary School	108	4.13	0.68
	Secondary School	100	4.10	0.67
	Vocational College	68	4.27	0.41
	Total	276	4.15	0.62
Application of Idea	Primary School	108	4.18	0.49
	Secondary School	100	4.08	0.43
	Vocational College	68	4.26	0.43
	Total	276	4.17	0.46
Reflection	Primary School	108	4.15	0.50
	Secondary School	100	4.01	0.62
	Vocational College	68	4.10	0.60
	Total	276	4.09	0.57

Also, Orientation is an action that teacher starting the lesson by using set induction to attract students or to gain students' interest to learn. For generation of idea, again, Vocational Colleges' teachers tend to have

highest score (M=4.29, SD=0.43) compare to primary schools' teachers (M=3.99, SD=0.47) and Secondary schools' teachers (M=3.97, SD=0.39). The generation of idea is the stage that required students to think and teachers will always apply questioning technique to execute this stage. During the restructure of idea phase, Vocational Colleges' teachers tend to have highest score (M=4.27, SD=0.41) compare to primary schools' teachers (M=4.13, SD=0.68) and Secondary schools' teachers (M=4.10, SD=0.67). At this stage, students are required to synthesize the learning content delivered and create their new knowledge. For the phase of application of idea, the result remains to show that Vocational Colleges' teachers tend to have highest score (M=4.26, SD=0.43) compare to primary schools teachers (M=4.18, SD=0.49) and Secondary schools teachers (M=4.08, SD=0.43). At this stage, students always being given exercise and the teachers will test whether they are able to apply the new knowledge into real life situation. The final phase is reflection where the students are required being evaluated their understanding towards the learning content. At this stage, primary schools' teachers are the champion (M=4.15, SD=0.50) compare to vocational colleges teacher (M=4.10, SD=0.60) and secondary teachers (M=4.01, SD=0.62). These findings show that primary schools teachers tend to conduct quiz, test, even examination more frequent than vocational colleges teachers and secondary schools' teachers.



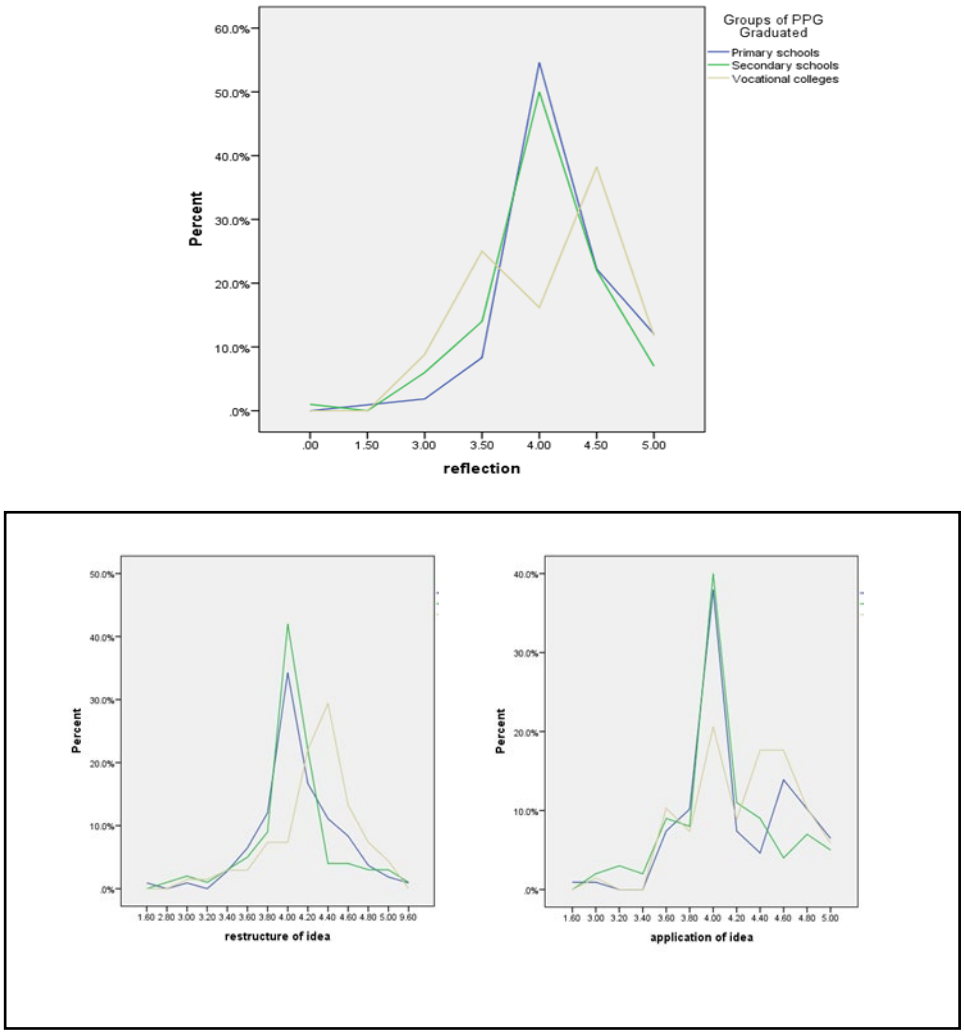


Figure 1. Pattern of score in fundamental instructional design skills among the three groups of PPGs graduated

The pattern of each phase's scores of fundamental instructional design skills among the three different PPG graduated groups is shown in Figure 1. For the orientation phase, teachers from three different groups tend to have mean score within 3.90 to 4.10. The methods frequently used to execute set induction in descending order are questioning (f = 211) > story telling (f = 147) > demonstration (f = 116) > mind map (f = 109) > video playing (f = 104) > others (f = 21). For the generation of idea phase, teachers from three different groups tend to have mean score within 3.90 to 4.30. All the three groups of teachers tend to have high mean score in restructuring of idea and application of idea, both is from 4.00 to 4.30. However, for the reflection phase, all of the three groups' teachers tend to have mean score from 4.00 to 4.15 only. In order to determine whether there is a significant difference in fundamental instructional design skills among the three different groups of PPGs graduated, one-way ANOVA test was conducted. The result of ANOVA test, as seen in Table 2 below:

Table 2. ANOVA

Phases of Needham Model		Sum of Squares	df	Mean Square	F	Sig.
Orientation	Between Groups	1.19	2	0.59	2.87	0.058
	Within Groups	56.33	273	0.21		
	Total	57.52	275			
Generate idea	Between Groups	4.93	2	2.46	13.03	0.000
	Within Groups	51.61	273	0.19		
	Total	56.53	275			

Restructure idea	Between Groups	1.35	2	0.68	1.75	0.175
	Within Groups	105.10	273	0.39		
	Total	106.45	275			
Application of idea	Between Groups	1.43	2	0.71	3.45	0.033
	Within Groups	56.56	273	0.21		
	Total	57.99	275			
Reflection	Between Groups	1.00	2	0.50	1.53	0.218
	Within Groups	89.25	273	0.33		
	Total	90.25	275			

Findings as showed in Table 2 illustrates that only generation of idea ($F = 13.03$, $p<.00$) and application of idea ($F = 3.45$, $p<.00$) are significant difference among these three different groups of PPGs graduated.

Table 3. Turkey HSD post hoc test.

Phases of Needham Model	Groups of PPG	Groups of PPG	Mean Difference	Sig.
Generate idea	Primary School	Vocational College	-0.30*	0.000
	Secondary School	Vocational College	-0.32*	0.000
		Primary School	0.30*	0.000
	Vocational College	Secondary School	0.32*	0.000
Application of Idea	Secondary School	Vocational College	-0.18*	0.028
	Vocational College	Secondary School	0.18*	0.028

Turkey HSD post hoc tests was the next analytical action being carried out to identify the pair of groups that contributed towards the significant of difference for the two phases of Needham Model and the result is stated in Table 3. For the generation of idea, vocational college teachers' score is higher than primary school (MD = 0.30) and secondary school teachers (MD = 0.32); primary school teachers also have the higher score in generation of idea than secondary school teachers (MD = 0.30). For the application of idea phase, vocational college teachers tend to have higher mean score than secondary school teacher (MD = 0.18).

4. Conclusion

As the research has demonstrated, most of the in-service teachers tend to have high score in fundamental instructional design skills, namely orientation, idea generation, idea restructuring, application off idea, and reflection. Vocational colleges' teachers were champion in all four phases of instructional design skills except reflection phase. The reflection phase was championed by teachers from primary school. On the other hand, secondary schools' teachers tend to achieve middle level across all instructional design skills compare to vocational colleges and primary schools' teachers. It is clear to show that PPG programme conducted by university is able to enhance the in-service teachers instructional design skills. Future study will be focus on the achievement of Programme Learning Outcome for this PPG programme to evaluate the effectiveness of the program's implementation towards Outcome Based Education.

Author Contributions: Conceptualization, M.F.L., C.S.L. and A.A.R.; methodology, M.F.L.; software, C.S.L.; validation, M.F.L., C.S.L. and A.A.R.; formal analysis, M.F.L.; investigation, M.F.L.; resources, M.F.L.; data curation, C.S.L.; writing—original draft preparation, M.F.L. and C.S.L.; writing—review and editing, M.F.L., C.S.L. and A.A.R.; visualization, M.F.L.; supervision, C.S.L.; project administration, C.S.L.; funding acquisition, M.F.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Acknowledgments: We would like to express our sincere thanks to Ministry of Education Malaysia (MOE) for the PPG grant (Vote No.: V024) awarded to support the publication of this work. We would also like to thank to the students who graciously gave their time to participate in this study.

Conflicts of Interest: The authors declare no conflict of interest.

References

An, Y.-J., & Reigeluth, C. (2011). Creating technology-enhanced, learner-centered classrooms: K–12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education*, *28*(2), 54–62. https://doi.org/10.1080/21532974.2011.10784681

Kasanda, C. D. (1995). Teaching practice at the University of Namibia: Views from student teachers. *Zimbabwe Journal of Educational Research*, *7*(1), 57–68. https://doi.org/10.1080/18146627.2013.855440

Kiggundu, E., & Nayimuli, S. (2009). Teaching practice: a make or break phase for student teachers. *South African Journal of Education*, *29*(3), 345–358. https://doi.org/10.15700/saje.v29n3a129

Lee, M. F., Lim, J. S. C., & Lai, C. S. (2020). Assessment of teaching practice competency among in-service teacher degree program (PPG) in Universiti Tun Hussein Onn Malaysia. *Journal of Technical Education and Training*, *12*(1), 181–188. https://publisher.uthm.edu.my/ojs/index.php/JTET/article/view/3058

Marais, P., & Meier, C. (2004). Hear our voices: Student teachers' experiences during practical teaching. *Africa Education Review*, *1*(2), 220–233. https://doi.org/10.1080/18146620408566281

Nair, S. (2005). Penggunaan model konstruktivisme lima fasa needham dalam pembelajaran sejarah. *Malaysian Journal of Educators and Education*, *20*, 21–41.

Ngidi, D. P., & Sibaya, P. T. (2003). Student teacher anxieties related to practice teaching. *South African Journal of Education*, *23*(1), 18–22. https://www.ajol.info/index.php/saje/article/view/24841

Perry, R. (2013). *Teaching Practice for Early Childhood*. Routledge. https://doi.org/10.4324/9780203392324

Villegas-Reimers, E. (2003). *Teacher professional development: an international review of the literature*. International Institute for Educational Planning Paris.