Research Methodology Knowledge between Master and Doctoral Education Research Students

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Abstract

Knowledge of research methodology is important for those who are required to read research articles. With the knowledge of research methodology, students will be able to evaluate whether the methods employed by the author is appropriate for the study. However, the differences in research experience between master and doctoral students influence their expectation of research methodology course. This paper examined the level of research methodology knowledge of master and doctoral research students in education after attending a series of research methodology courses. Based on 39 respondents, this paper revealed that both groups are at Moderate Low level. Further analysis revealed that 44.4% of master students are at Low level compared to only 23.8% of doctoral students who are found at the Low level. It was also revealed that both groups have difficulties in quantitative research concepts specifically on research design, sampling, and data collection topics. The most common suggestions received from master students are to segregate the course between master and doctoral students and to have more specific content on the course. Future study should have more representatives of postgraduate students and larger samples for inferential statistics to compare mean between the groups and to examine the association between research experiences and research methodology knowledge.

1. Introduction

Currently, Malaysia education is facing issues such as an increase of students' dismissal and postgraduate students takes longer than the usual duration to complete their research study (Hasnan *et al*., 2015; Nurhazani *et al*., 2015). This issue has considerably attracted the attention of the

government, stakeholders, and the institutions itself (Hasnan *et al*., 2015). Necessarily, several studies were conducted by previous researchers to identify factors or difficulties encountered by postgraduate students which may contribute to the delay in completing their thesis or eventually lead to withdrawal. These studies have proposed ways to assist postgraduate students through various stages of their research process (Anbuselvan *et al.*, 2015; Gaffner & Wilson, 2015; Ngozi & Kayode, 2013; Nurhazani *et al*., 2015).

One of the factors of the delay in completing their thesis is lack of knowledge about research methodology (Salehuddin *et al*., 2014). According to Salehuddin *et al*. (2014), students' performance in conducting research is still unsatisfactory as students are not able to apply what they have learned despite attending research methodology courses. Literatures suggest that students may experience learning difficulties in research methodology class that could hamper their interests and attitude towards research productivity (Wang & Guo, 2011). Consequently, students struggle to see the link between the modules and their research project (Dyrhauge, 2014; Kilburn *et al*., 2014a). Early (2014) argues that though vast attention is given to the need of the research methodology courses, there is less attention given to the learners, how the course should be conducted, and the outcomes of the courses.

Considering the research methodology is a complex domain itself which consists of contrasting perspectives, procedures, and definitions, providing the courses to students is particularly challenging (Early, 2014; Dyrhauge, 2014; Kilburn *et al*., 2014b). From an instructor's perspective, it is very hard to produce a module that can be used in research methodology courses that is aligned to the students' needs (Dyrhauge, 2014; Early, 2014). Additionally, students who attended the course are not homogenous; they have different level of prior knowledge on research methods, research skills, abilities, and experience (Kilburn *et al*., 2014a). Thus, their expectation of the courses varies as well. While some students may expect the introductory research method course, some may expect the course to be more advanced (Early, 2014; Kilburn *et al*., 2014a). Students' diverse background makes it harder for instructors to produce teaching modules that could benefit every single one of them. (Kilburn *et al*., 2014b).

Therefore, this paper identifies the level of research methodology knowledge of master and doctoral students after attending the research methodology course in one of the research universities in Malaysia. This paper also explores students' perspective on the course and how it can be improved.

2. Literature Review

As part of the requirements for the award of degrees in higher education institutions, students at undergraduate and postgraduate levels are required to conduct independent academic research. Thus, research methodology courses are seen as essential by the institutions as it serves as the foundation of any good academic research. There is a variety of research methodology courses available depending on the institution such as seminars, colloquiums, workshops, and online courses with the purpose of assisting graduate students in conducting their academic research.

However, learning and teaching research methodology are challenging for both students and instructors. Research methodology courses continuously cause problems for many students. Learning difficulties may be due to individual differences in terms of motivation and attitude (Balloo *et al*., 2016; Wang & Guo, 2011), cognitive complexity and prior knowledge (Lehti & Lehtinen, 2005; Murtonen & Lehtinen, 1999). It has been suggested that prior knowledge or previous experiences found to be related to the development of research methodology knowledge, and structure of methodology module (Ball & Pelco, 2006; Dyrhauge, 2014; Kilburn *et al*., 2014a; Kilburn *et al*., 2014b). Consequently, despite the several courses attended, students still fail to meet the expectation (Balloo *et al*., 2016; Lehtinen & Rui, 1995).

The result from a longitudinal study done by Balloo *et al*. (2016) found that there is no significant improvement in students' structural research knowledge after a year, however, there is a little improvement by the end of the second's year. This is due to various metacognitive and motivational variables which significantly correlate to the development of the research methods knowledge. This study also found that not all students appear to benefit from participating in research method courses. Similarly, a study conducted by Ball and Pelco (2006) identify challenges in teaching research methods for undergraduate psychology students; (i) the high technical complexity of the course material and (ii) low students' interest towards the material.

Similarly, a study by Lehti and Lehtinen (2005) concluded that many students have claimed even after participating multiple methodology courses, they still have poor understanding of research methods. Exceptionally, there are some students who appear to develop the knowledge more readily than others. Thus, individual differences somewhat play a role in the development of knowledge, skills, and achievement.

(i) The difference of how students develop their knowledge potentially due to the structure of the methodology module at that university.

(ii) Role individual difference: self-regulatory/self-efficacy/self-perceived and motivational constructs found to be significantly correlated to higher structural knowledge and development of structural knowledge.

(iii) Prior knowledge also found to be related to the development of research methods knowledge. Deliberate practice is the largest predictor of knowledge and skills in general.

A qualitative study conducted by Kilburn *et al*. (2014b) identifies challenges perceived by learners and instructors on the research methods short course. This short course was attended by learners who each have different levels of prior knowledge on research methods, research skills, abilities, and experience. Their expectations of the course vary widely. Learners who have more experience in conducting research thought that the course could be more complex and more depth while to some learners the course was something completely new. Thus, to instructors, this is challenging to plan their teaching to meet learners' expectations and needs.

Similarly, according to Dyrhauge (2014), research methods courses often seen as tiresome by the students and lecturers are often not helping in making these courses relevant for the students' learning process. Most students claim that the teaching methods lack excitements. Students also find the module uninteresting and irrelevant to their own research. In lecturers' perspective, it is very hard to produce a module that can be used in research methods courses that is aligned to students' own research which enable them to apply the methods in their studies.

A study done by Cassidy and Eachus (2000) showed how students' perceived proficiency on research methodology increased with strategic learning approach. They also added that perceived proficiency on research methodology was positively correlated with academic achievement in research methodology. Another study that is similar to Cassidy and Eachus (2000) was done by Boswell (2013) where the study showed that perceived knowledge of research methodology is correlated with students' interest in learning research methodology. Both studies associated perceived knowledge and self-efficacy in research methodology with learning strategy. By improving teaching and learning style, it can increase students' interest and their academic performance on research methodology.

A review done by Wang and Guo (2011) found that learning difficulties in research method courses is likely to affect students' interest and attitude towards research productivity. Learning difficulty leads to low motivation to actively participate and engage in research methods. Consequently, they will have less dedication in future research productivity. Students who have experience in research activity and have additional research training especially doctoral students are

likely to engage more during class. Unlike master students, they have less focus due to insufficient research training. Similarly, the instructors of research methodology are experiencing this problem as postulated by Braguglia *et al*. (2012) in his study. Therefore, due to differences in prior knowledge of students in research methodology, the instructors struggle to make research methodology interesting.

3. Research Methodology

The survey was distributed to 42 postgraduate education research students in one research university in Malaysia. The respondents were purposively selected after they have completed a series of research methodology courses. The data was analyzed using the Rasch Measurement Model where three respondents were omitted as they did not meet the Rasch analysis requirement. The final respondents included 21 doctoral students and 18 master students.

4. Research Instrument

The instrument consists of 15 multiple-choice questions with 3 options of basic knowledge of research methodology in educational research. The items include questions on research design, sampling, data collection, verifying research variables and establishing validity and reliability. Other than questions on research methodology, the instrument also include items on students' perceptions towards the difficulty of research methodology; Most difficult topic (research design, population, and sampling, developing instrument, data analysis, all), their satisfaction of the course (yes/moderate/no), and their suggestions on how the course can be improved (short answer). The instrument was validated and piloted prior to field study.

5. Results

Research Methodology Knowledge Level of Postgraduate Students

Using Rasch Analysis approach, the cut scores for research methodology knowledge levels were arbitrarily determined based on the item difficulty mean (0.00) and its standard deviation (SD) (0.61) which are obtained from Winstep software. The number of levels was determined based on the strata value, $H = ((4 \times 2.52 \text{ (item separation)}) +1)/3 = 3.69 \approx 4$ levels. The levels are low (<-0.61), moderate low ($-0.61 \leq ML < 0.00$), moderate high ($0.00 \leq MH \leq 0.61$), and high (> 0.61).

Table 1- Research Methodology Threshold Value

| Research Methodology Level	Threshold Range	Threshold Logit
Low	> -1SD	> -0.61
Moderate Low	-1SD ≤ ML < Mean	- 0.61 ≤ ML < 0.00
Moderate High	Mean ≤ MH ≤ 1SD	0.00 ≤ MH ≤ 0.61
High	> 1SD	> 0.61

The postgraduate students were categorized into each level based on their person measure obtained from Winstep software. The levels are shown in Table 2. Overall, the level of postgraduate research students is at moderate low with the mean of -0.24. The mean for doctoral students is -0.06, while master students is -0.45. The level of both groups is at moderate low.

Table 2- Postgraduates' Research Methodology Knowledge Level

Group	Mean	Research Methodology Level
Master Student	-0.45	Moderate Low
Doctoral Student	-0.06	Moderate Low
Overall	-0.24	Moderate Low

Further analysis is shown in Figure 1, indicates the percentage difference of postgraduate students in each level. There is no significant difference in the percentage of master students group and doctoral students group in high level, and moderate high level. There is an obvious difference in percentage between the groups in low level which can be seen that the percentage of Master students in the group is 20% higher than Doctoral students.

Figure 1- Percentage of Postgraduate Students in Each Level
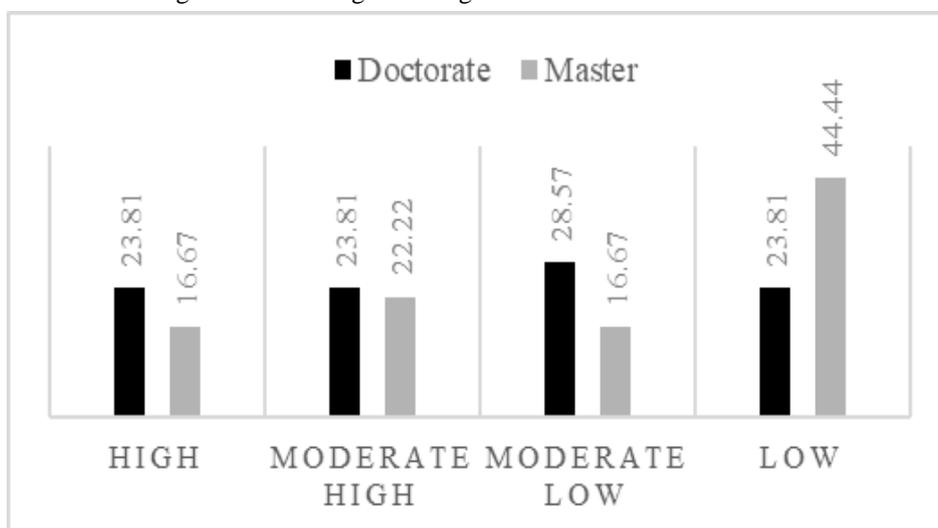
Further analysis was conducted to identify which research methodology item is the most difficult and which item is the easiest. Table 3 shows item difficulty logit of each item. The highest difficulty logit is the item measuring quantitative method. Item 10 and Item 1 have the highest difficulty logit (0.90). Item 10 measures non random sampling in the context of the quantitative method while Item 1 measures research design of the quantitative method. As can be seen, most of the quantitative research method items have positive logit except for only two items measuring variables, Item 13, and Item 14. All items measuring mix-method have negative logits, and two items (Item 2 and Item 8) in the qualitative method items have a positive logit with both items measured validity.

Table 3- Research Methodology Question Analysis

Subcomponent		Question	Logit	Mean Difficulty
Quantitative Research Methodology	Nonrandom Sampling	1	0.90	0.28
	Research Design	10	0.90	
	Nonrandom Sampling	11	0.30	
	Data Collection	12	0.59	
	Variables	13	-0.34	
	Variables	14	-0.62	
	Validity	15	0.49	
Qualitative Research Methodology	Validity	2	0.49	-0.31
	Data Collection	7	-1.43	
	Validity	8	0.12	
	Nonrandom Sampling	9	-0.43	
Mix-method Research Methodology	Nonrandom Sampling	3	-0.34	-0.25
	Random Sampling	4	-0.34	
	Random Sampling	5	-0.16	
	Research Design	6	-0.16	

Perception towards Research Methodology

Analysis in Figure 2 shows that 43.59% of the respondents perceived that the difficulty of the research methodology course is at Moderate Level. Only 17.95% of the respondents perceived the course as easy. Among all topics included in the course, data analysis is chosen as the most difficult topic by the respondents (64.10%) followed by research design (58.97%) and population and sampling (48.72%).

Figure 2- Difficulty of Research Methodology Topic
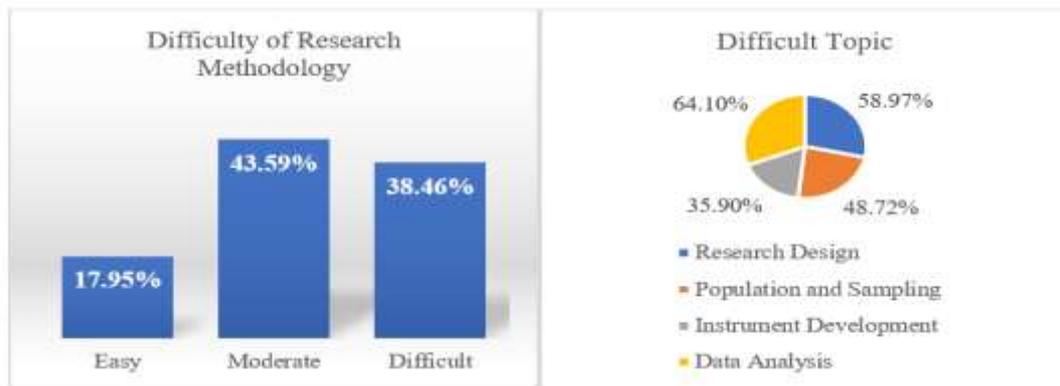
Overall, as shown in Figure 3, more than 50% of the respondents were satisfied with the course, and only 43.59% of the respondents were unsatisfied with the course. As for the improvement of the course, only 11 out of 31 respondents respond to the short answer item. Among 11 respondents, 7 of them are Master students and 4 of them are Doctoral students. Suggestions include to have at least one assessment after each session, course segregation between Master and doctoral students, longer duration required for each session and course should be more specific.

Figure 3- Satisfaction and Improvement of the Research Methodology Course

6. Discussion and Conclusion

This paper measured three subcomponents of knowledge of research methodology namely quantitative research approach, qualitative research approach and mix-method research approach were developed based on the combination of research design, sampling, or data collection.

This study revealed that postgraduate students have Moderate Low level in knowledge of research methodology. Both groups; master and doctoral students are at Moderate Low level. Though the average mean indicated Master students are at Moderate Low level, further analysis showed that majority of Master students are at Low Level while only a small percentage of them are at Moderate

Low level. While for Doctoral students, the majority of them are at Moderate Low level. Further additional analysis found that among three subcomponents; items measuring quantitative research approach are the most difficult to be answered by the postgraduate students specifically on sampling, research design, and data collection topics.

The argument can be deduced from this is that doctoral students have more experience in research compared to master students. Doctoral students probably attended more courses and have conducted independent research previously compared to master students who just embarked on the research journey. Lehti and Lehtinen (2005) also suggested that prior knowledge or previous experiences are related to the development of research methodology knowledge. Consequently, in this study, master students have suggested the research methodology course should be segregated between master and doctoral students. They also suggested that the course should be specific. This has also been revealed in Early (2014) and Kilburn *et al*., (2014a); students' expectation of the courses varies with some students may expect the introductory research method course, and some may expect the course to be more advance.

The difficulty of students in research methodology is understandable. Previous literature (e.g., Balloo *et al*., 2016; Braguglia *et al*., 2012; Wang & Guo, 2011) also have discussed the difficulties of students in understanding research methodology. Hence, this study provides an insight for instructors to reassess the teaching and learning structures of research methodology. Learning institutions are recommended to provide intensive and varied courses to postgraduate research students ranged from basic to advance research methodology courses to cater to students' different backgrounds. Apart from that, postgraduate students are advised to take the initiatives to be more resourceful and not solely relying on only the courses offered by their institutions. Limitations of this study could be improved in the future by using inferential statistics such as t-test to compare mean score between master and doctoral students or examine association between research experiences and research methodology knowledge with a larger sample size.

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