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Factors Influencing Students' Research Self-Efficacy: A Case Study of University Students in Malaysia

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ABSTRACT

Purpose: The main aim of the study was to investigate the relationship between research self-efficacy and the perception of the research training environment, interest in research, research mentoring experience, and research knowledge within a sample of Ph.D. students (N=120) at a local university in Malaysia.

Method: Correlation and regression analysis were employed to investigate the impact of research mentoring, research training environment, interest in research and research knowledge on research self-efficacy. Self-reported questionnaires and a research knowledge test were distributed to the Ph.D. students in the university to collect the data.

Findings: An apparent correlation was found between research self-efficacy, research training environment, interest in research and research mentoring while research self-efficacy was not correlated with research knowledge. Research training environment and interest in research contributed to 26 percent of the variance of change in research self-efficacy.

Implications for research and practice: Conducive environment in the institution fosters higher levels of research self-efficacy and encourage Ph.D. students' research skills and development. Furthermore, the incorporation of research methodology as a compulsory course in the Ph.D. study serves to improve students' research interest and knowledge. The self-efficacy theory helps to assist decision making in identifying future researchers in the institution.

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Introduction

Research self-efficacy was described as the confidence in carrying out research activities from organizing a research plan to carrying out the research process from library research and reading to writing and publication (Forester, Kahn & Hesson-McInnis, 2004). The accurate assessment of research self-efficacy may assist the faculty to identify a given students' self-identified strengths and weaknesses with respect to research, thereby facilitating graduate research. High research self-efficacy was an important factor related to students' successfully conducting research and pursuing research beyond graduate study (Forester et al., 2004).

Research is an important area for sustainability in Malaysian higher education because of its volatilities in global higher education (Omar, Mohd Ali, Khalid, Zakaria & Anuar, 2013). The integration of higher education policy with good research was a determining factor in global competitiveness with neighbor countries (Koo, Fazal Mohamed & Kemboja, 2012). Furthermore, research produces new knowledge, and it is essential to the country's growth and development (Yazit & Zainab, 2007). In recent years, the number of Ph.D. enrollments in Malaysia has dropped significantly. For example, in 2009, the number of admission into Ph.D. programs in Malaysia was 4,942 and number of graduate for that year was 750 for both Public and Private University (Ministry of Higher Education, 2015). The shortage of Ph.D. graduates in Malaysia implies that it is crucial that the Ph.D. students are of high quality, well trained and possess a high level of research self-efficacy in order to become competent researchers in the future (Aziz, 2016).

Although there was a positive outlook in the trends of research, output in social science and humanities, further efforts were required to ensure the sustainability and continuous growth towards a knowledge-based country (Ahmad, 2012). The success of the National Higher Education Action Plan Phase 2 (2011 - 2025) or known as Pelan Strategik Pengajian Tinggi Negara (PSPTN) has led to the new Malaysian Education Blueprint 2015-2025 for higher education (Pelan Pembangunan Pendidikan Malaysia (Pendidikan Tinggi) (PPPM) 2015 – 2025 where the success of a giant leap of increase in the output of research was recorded. The "Innovation Ecosystem" agenda in the Malaysian Education Blueprint (2015-2025) encourages more academics to partner with the community to develop and commercialize ideas. Ministry of Higher Education facilitates the development of an innovation ecosystem in selected strategic areas that are critical to the nation's economic growth. Therefore, more Ph.D. graduates are required as the universities now need to improve research skills (Ministry of Higher Education, 2015).

Three (3) important research objectives were constructed in the study.

Research objective 1:

The main research objective was to find out the level of research self-efficacy of Ph.D. students.

The research objective 1 was further divided to:

a) Find out the level of research mentoring experience of Ph.D. students.

b) Find out the level of the research training environment.

c) Find out the level of interest in research among Ph.D. students.

d) Find out the level of research knowledge that Ph.D. students possess.

Research objective 2:

To find out the relationships between research mentoring, research training environment, interest in research, research knowledge and research self-efficacy.

Research objective 3:

To find out the impact of research mentoring, research training environment, interest in research, research knowledge on research self-efficacy.

Problem Statement

The 11th Malaysian Plan, Economic Transformation Programme (ETP) and New Economic Model (NEM) are series of programs introduced by the Malaysian government in order to propel Malaysia towards becoming a high-income nation by 2020 (Chin, 2015). To achieve vision 2020, a highly-skilled, creative and innovative workforce becomes essential to realize such aspiration. Organisation for Economic Cooperation and Development (OECD) reported on the structural policy in Malaysia has found that the talent base of the workforce has been lagged behind the standards of high-income nations (OECD, 2013).

Malaysia suffers from a shortage of skilled workforce and is overly reliant on its low wages and unskilled workers. An example of over-reliance on unskilled workers is the recent Memorandum of Understanding (MoU) signed between Malaysian and Bangladesh where Malaysia agrees to hire 1.5 million of the Bangladeshi workers over the next five years (Carvalho & Rahim, 2016). The Labor Force Report by the Department of Statistics in Malaysia has reported that only 55.5 percent of the employed workforce attained secondary education in 2014, and it has declined by 0.5 percentage points as compared to 2013 (Department of Statistics Malaysia, 2014). Furthermore, the percentage of employed persons with primary education and no formal education declined by 1.1 percentage points and 0.3 percentage points, respectively.

The Malaysian government realized that the education system in Malaysia requires a change to transform itself into a high-income and knowledge-based country. Therefore, the Malaysian Education Blueprint (2015-2025) (or known as Pelan

Pembangunan Pendidikan Malaysia (Pendidikan Tinggi) (PPPM) 2015 – 2025 by the Ministry of Higher Education was launched to transform the education system to be ahead of global trends (Ministry of Higher Education, 2015). The Malaysian Higher Education Blueprint 2015-2025 has reported that the number of research publications was not as widespread and intensive as desired (Ministry of Higher Education, 2015). The MyBrain15 program was implemented in 2008 to increase the number of Ph.D. holders in the workforce (The Star Online, 2008). Ministry of Higher Education realized there was a shortage of critical mass for researchers to drive innovation and economic growth in Malaysia. Malaysian universities faced a shortage of lecturers with Ph.D. qualifications as they push to achieve the target workforce which consists of 75 percent of lecturers with Ph.D. (University World News, 2011). Medical lecturers left the public sector for a better remuneration package and career development (Chin, 2014). The direct effect of the shortage of qualified lecturers in Malaysia has caused the workforce to be lagged behind high-income nations (OECD, 2013).

MyBrain15 was an accelerator program initiated to produce 60,000 Ph.D. holders in Malaysia by 2023 as the country faces a shortage of Ph.D. holders in the workforce (MyBrain15, 2008). Over the years, the Ministry of Higher Education has maintained its budget allocation in providing assistance to those who wish to pursue their Ph.D. through the MyBrain15 program. For example, a total of 20,000 scholarships, where 15,000 were offered for Master's and 5,000 were offered for Ph.D. program in 2016 (Ahmad Kamil, 2016). The objective of the MyBrain15 Program is to produce 60,000 Ph.D. graduates by the year 2023. As of December 2015, the target of 60,000 Ph.D. graduates has not been achieved and 8,205 students have received the offers under MyPh.D. and MyPh.D. Industri program (Ahmad Kamil, 2016).

The number of Ph.D. enrollments has also dropped significantly. For example, in 2009, the number of admissions into Ph.D. programs in Malaysia was 4,942 and number of graduates for that year was 750 for both Public and Private University (Ministry of Higher Education, 2015). The shortage of Ph.D. graduates in Malaysia implies that it was crucial that the Ph.D. students are of high quality, well trained and possess a high level of research self-efficacy in order to become competent researchers in the future (Aziz, 2016). Evans (2012) pointed out that the attitudinal component of researcher development has been largely overlooked and it may be the reason why research behavior and productivity are not enhanced as expected. In fact, Evans (2011) argues that the attitudinal component of researcher development is crucial towards shaping a researcher's intellectual and behavioral development. Attitudinal development includes the researcher's perception of the relevance and usefulness of research and his or her self-efficacy (Evans, 2011).

Higher education institutions have been tasked to develop graduate students to become psychologically competent and effective researchers with sufficient levels of research competency (Unrau & Beck, 2004). Universities are compelled to provide students with an appropriate research environment and experience as well as adequate psychological confidence for challenging research tasks (Bernardin, 1996; Presely & Engelbride, 1998). Ph.D. graduate drop-outs range from 30 to 50 percent, depending on the discipline and country (Cassuto, 2013; Fullick, 2013).

One of the factors that caused the students to drop out their studies was due to the incompletion of the thesis. The studies of Bowen and Rudenstine (2014); Kerlin (1995); and Tinto (1993) further discovered that many Ph.D. students were "caught" in a situation named as "All but Dissertation." The ABD (All but dissertation) refers to a situation whereby the doctorate student has completed all of the requirements of the degree except for the dissertation/thesis. A student usually proceeds as a doctoral candidate once he or she has completed all the coursework required for the degree and has passed the comprehensive exam. The doctoral degree will be conferred to the student who has completed their thesis (Kuther, 2015). Unfortunately, many students remain in the ABD status because of poor research self-efficacy, difficulties faced in research, loss of interest and motivational deficits (Kuther, 2015).

Many studies have demonstrated that the number of Ph.D. graduates in the country has not reached its target number, and the level of research self-efficacy has diminished among the students (Ahmad Kamil, 2016; Aziz, 2016; Evans, 2011). Some scholars have suggested that the lack of research self-efficacy was due to mentors (Hollingsworth & Fassinger, 2002), research training environment (Schlosser & Gelso, 2001), interest in research (Lambie & Vaccaro, 2011) and research knowledge (Lambie et al., 2014). However, to date, no comprehensive study has been carried out to determine the factors influencing students' research self-efficacy at a public university in Malaysia. The study was conducted to solve the problems identified among Ph.D. graduates in the country.

In addition, three (3) important research questions were identified based on the research objectives.

Research question 1:

What is the level of research self-efficacy of Ph.D. students?

a) What is the level of research mentoring experience that Ph.D. students have throughout their study?

b) What is the level of research training environment that Ph.D. students have?

c) What is the level of interest in research that Ph.D. students possess?

d) What is the level of research knowledge that Ph.D. students possess?

Research question 2:

What are the relationships between research self-efficacy and research mentoring, research training environment, interest in research, and research knowledge?

Research question 3:

What is the impact of research mentoring, research training environment, interest in research, and research knowledge on research self-efficacy?

Research hypothesis

Five (5) research hypothesis was identified in the study and illustrated as follows:

H1: There is a positive relationship between research self-efficacy and research training environment.

H2: There is a positive relationship between research self-efficacy and interest in research.

H3: There is a positive relationship between research self-efficacy and research mentoring experience.

H4: There is a positive relationship between research self-efficacy and research knowledge.

H5: There is a positive impact of research mentoring, research training environment, interest in research, and research knowledge on research self-efficacy.

Literature Review

Research self-efficacy

The broad concept of self-efficacy was a relevant indicator many areas such as academic (Collins, 1982; Lee & Ciftci, 2014; Multon, Brown & Lent, 1991; Schunk & Rice, 1993) and research (Bako-Okolo, 1993; Bieschke, Bishop & Garcia, 1996; Faghihi, Rakow & Ethington, 1999; Holden, Barker, Meenaghan & Rosenberg, 1999; Lambie, Hayes, Griffith, Limberg & Mullen, 2014; Pasupathy, 2010; Petko, 2012; Phillips, 1992; Rezaei & Miandashti, 2013; Vaccaro, 2009; Welzer-Ward, Baltes, Hoffman-Kipp & Lynn, 2010). Table 1 displays a summary of self-efficacy research in other areas.

Table 1

Summary of Self-Efficacy Research in Other Areas of Study.

Area of Study	*Authors*
Counseling	Al-Darmaki (2012); Chaney, Hammond, Betz & Multon (2007); Lam, Tracz & Lucey (2013)
Healthcare	Byrne, Barry & Petry (2012); Callaghan (2005); Chiu & Tsai (2014); Fillman (2015); Grembowski et al. (1993); Longmore, Manning, Giordano & Rudolph (2003); Mackenzie & Peragine (2003); Robb (2012); Shao, Chuang & Chen (2015); Torres, Torres, Rodríguez & Lee (2003); Zubaran et al. (2010)
Parenting	Coleman & Karraker (2000)
Social work	Ellet, (2007); Pennanen, Haukkala, Vries & Vartiainen (2011); Reeb, Folger, Langsner, Ryan & Crouse (2010); Rodebaugh (2006)
Teacher	Aydemir, Duran, Kapıdere, Kaleci & Aksoy (2014); Frazier & Osaghae (2011); Jaafar et al. (2012); Morris & Usher (2011); Raudenbush, Rowan & Cheong (1992)
Internet	Chuang, Lin & Tsai (2015); Kaya & Durmuş (2010); Kuo, Walker, Schroder & Belland (2014)
Computer	Hodges (2008); Jegede (2014); Kher, Downey & Monk (2013); Pellas (2014)
Mathematics	Jameson & Fusco (2014); Pampaka, Kleanthous, Hutcheson & Wake (2011)
Sports	Lane et al. (2004)
Online technology	Bergey, Jass, Senfeng & Uma (2015); Lee (2015); Wang, Harris, & Patterson (2013)
Mobile learning	Mahat, Ayub & Luan (2012)
Reading and writing	Leader-Janssen & Rankin-Erickson (2013); Pajares (2003); Prat-Sala & Redford (2012)
Dissertation	Varney (2010)

Hartadiyati (2015) made an astonishing finding in teacher self-efficacy where the concept of self-efficacy was utilized as a bridge that connects the knowledge of instructional strategies of science teaching to students' understanding of science knowledge. The researcher proposed that teacher and students' self-efficacy beliefs was improved in pedagogy content knowledge (PCK) through modeling, sharing the story of self-efficacies in science, constructive feedback and effective use of lesson study. The recommendation of increasing teacher self-efficacy using collaborative skills and classroom instruction was also discussed in Malinen, Savolainen, and Xu (2012). Self-efficacy also influences teachers' academic performance (GPA) in the Iranian English teachers (Ghonsooly, Hassan & Mohaghegh, 2014).

The meta-analysis of Chesnut and Burley (2015) indicates that pre-service and in-service teachers' self-efficacy was positively related to their commitment in the teaching profession. Research self-efficacy was a derivation from the Social Cognitive Theory by psychologist Albert Bandura (Bandura, 1977a, 1982, 1986, 1995, 1997). Social Cognitive Theory also acts as a basis for understanding the influence of teacher self-efficacy beliefs in sustaining their satisfaction and the students' achievement (Caprara, Barbaranelli, Steca & Malone, 2006). While a variety of definitions for research self-efficacy were available in current research, the study used the definition suggested by Forester, Kahn and Hesson-McInnis (2004) who described research self-efficacy as "the confidence in carrying out research activities from the point of organizing a research plan to carrying out the research process from library research and reading to writing and publication."

In fact, social work educators have identified the main reason that caused students to dislike research was the feeling of uncertainty in their own abilities to conduct research (Epstein, 1987; Reissman, 1993; Royse & Rompf, 1992; Wainstock, 1994). Furthermore, Bieschke, Bishop & Herbert (1995) suggested that research self-efficacy determines the perseverance of a student's research behaviour. The accurate assessment of research self-efficacy may assist the education faculty to identify a given student's self-identified strengths and weaknesses with respect to research, thereby facilitating graduate research. For instance, the acceptance of Bandura's theory of self-efficacy forms a basis for measures of self-efficacy; which leads to useful predictions of future productivity and mastery of research skills (Brown, Lent, Ryan & McPartland, 1996; Forester et al., 2004; Lynch, Zhang & Korr, 2009; Multon, Karen, Brown & Lent, 1991; Schunk, 1995; Zimmerman, 1995). Additionally, the completion of the thesis was an essential part of a Ph.D. program; and there were no alternatives to graduation except the completion of the thesis (Isaac, Quinlan & Walker, 1992). Zhao, McCormick and Hoekman (2008) and Vasil (1992) found research self-efficacy and research productivity to be statistically significant and differ between genders. Males had higher research self-efficacies and research productivities than females.

A considerable amount of research has been published on research self-efficacy. These studies have led to significant outcomes on students' tendency towards research. For instance, lower research self-efficacy can interfere with students' research training and students' willingness to conduct research and result in a lower contribution to their field of study (Love et al., 2007). Lynch, Zhang and Korr (2009) conclude that social work practitioners prefer to participate in research activities when they have a stronger level of research self-efficacy. The findings were consistent with those in Unrau and Grinnell (2005) where the authors revealed that the research on confidence levels and gains were important dimensions of students' learning experience in social work research courses.

Forester et al. (2004) found that high research self-efficacy was a crucial factor related to students successfully conducting research and pursuing research beyond graduate study. Lambie, Hayes, Griffith, Limberg and Mullen (2014) and Lambie and Vaccaro (2011) came to a conclusion that research self-efficacy scores predicted higher levels of interest in research and research knowledge. Additionally, the students who

participated in research activities, including publishing manuscripts, scored higher in research self-efficacy than those not participated in the publication process. Faghihi et al. (1999) concluded that higher self-efficacy in research was positively related to students' dissertation progress.

Their study proved that research self-efficacy was the most important factor influencing students' dissertation progress and it confirmed a few of the previous studies that demonstrated self-efficacy as being an important predictor of students' persistence and academic achievement (Landino & Owen, 1988; Lent, Brown & Larkin, 1984; Multon, Karen, Brown & Lent, 1991). On the other hand, Lambie and Vaccaro (2011) also identified that doctoral students in their 3rd year of preparation had higher research self-efficacy scores than did 1st and 2nd year students. The results for the relationship between research self-efficacy and year of study consists of diverse results; for instance, the results in Lambie and Vaccaro (2011) were consistent with those in Kahn and Scott (1997) and Lambie et al. (2014). However, Kahn (2001) found that there was no significant relationship between research self-efficacy and year of study. The difference of the results may be related to the difference in samples or difference in the course of study. Besides, prior studies used different scales in measuring research self-efficacy (Greeley et al., 1989).

Vaccaro (2009) identified that research self-efficacy was positively correlated with interest in research but the results contradicted with the work of Petko (2012) where it was reported that research self-efficacy was positively correlated with interest in research but negatively correlated with research mentoring. Furthermore, Petko (2012) found that interest in research and research mentoring did not have a statistically significant relationship. The research of Love et al., (2007) concluded that research self-efficacy was influenced by a positive mentoring environment while Bishop and Bieschke (1998) came to a conclusion that the factors of research self-efficacy and the mentoring environment had an influence on research interest. The findings from Bishop and Bieschke (1998) was supported by numerous studies concluding that interest in research had an influence on research self-efficacy (Bieschke, Bishop & Herbert, 1995;.Bieschke, Bishop & Garcia, 1996; Bieschke, 2006).

Despite the emergence of growing literature supporting the positive effects of interest in research on research self-efficacy, Kahn (2001) concluded that interest in research only has an indirect relationship to research self-efficacy. Kahn (2001) reported that levels of research self-efficacy increased in tandem with participation in research related activities. Research self-efficacy was found to be a good predictor of student interest in conducting research and related activities (Bishop & Bieschke, 1998; Kahn & Scott, 1997; Lent, Lopez & Bieschke, 1993; Lopez, Lent, Brown & Gore, 1997). Szymanski, Ozegovic, Phillips and Briggs-Phillips (2007) concluded that research self-efficacy and interest in research scores predict levels of scholarly productivity.

The findings from Boswell (2014) were rather intriguing; as it was found that research self-efficacy did not equate to competence, and it was possible that participants might overestimate their abilities in conducting research. Individuals have the tendency to over-rate their competence and base their performance on

incorrect pre-conceived notions. Thus, the situation leads individuals to make incorrect judgments about their own abilities (Dunning, Johnson, Ehrlinger & Kruger, 2003; Dunning, Heath & Suls, 2004). Furthermore, Pan, Sun and Chow (2011) found that the impact of mentoring was weaker on individuals with lower self-efficacy. Huge amount of literature has shown that students scoring at higher levels of interest in research had higher levels of research self-efficacies than those who score lower in interest in research.

Lastly, Kahn (2001) and Phillips and Russell (1994) reported that research training environment was proven as a strong predictor of research self-efficacy. Phillips and Russell (1994) concluded that counseling psychology doctoral students' levels of research self-efficacy and perceptions of the training environment were positively correlated. Although positive correlations exist between the two constructs, Saral and Didem (2015) made an interesting finding in their study where they found that educational students' research self-efficacy varied according to the different departments they came from such as psychological counseling and guidance, elementary school mathematics teaching, science teaching, and computer and teaching technologies.

Method

Research Design

Extensive data filtering was employed to ensure the reliability of the data prior to data analysis. Data mean were used to determine the level of research self-efficacy, research training environment, interest in research, and research mentoring while the frequency of scores was employed to ascertain the level of research knowledge of the respondents. Correlational analysis was conducted to find out the relationships between research self-efficacy, research training environment, and interest in research, research mentoring and research knowledge. Regression analysis was employed to find out the impact of research mentoring, research training environment, interest in research, and research knowledge on research self-efficacy. Moderate levels of research self-efficacy and high levels in the research training environment, interest in research and research mentoring was found among the respondents. Unfortunately, the majority of them have low levels of research knowledge. An apparent correlation was predicated between research self-efficacy, research training environment, interest in research and research mentoring while research self-efficacy was not correlated with research knowledge. Results from regression analysis showed that research training environment, interest in research contributed to 26 percent of the variance of changes in research self-efficacy.

A correlational design was implemented which included the following statistical analyses: Pearson's correlation coefficients (two-tailed) and independent t-test. Data were collected from four faculties in the university. A total of five (5) instruments and one (1) demographic survey was used to measure the constructs involved in the study.

Research Sample

The sample size formula was estimated according to the prescriptions in Krejcie and Morgan (1970). The researcher utilizes a power analysis formula for experiments in calculating the sampling errors (Cohen, 1988; Lipsey, 1990; Murphy & Myors, 1998). A stratified sampling was used by the researcher to obtain all relevant information on research self-efficacy. Stratified sampling is a sampling method whereby the populations are divided into subpopulations (stratas) and random samples are drawn from each stratum (Laerd Statistics, 2012). A first strata was drawn from a population of university students pursuing their Ph.D. study.

The population consists of students from four different faculties (Management, Graduate School of Business, Education and Housing, Building and Planning). Out of a total of 809 students, second strata were drawn and further divided into two groups; mainly students who enrolled for less than 3 years; and another group of students who enrolled for more than 3 years.

Research Instrument and Procedures

The level of research self-efficacy was measured using the self-efficacy in research (SERM) brief form. This is a 12-item self-report measure of a doctoral students' self-efficacy with respect to doing research (Kahn & Scott, 1997). It contains items assessing self-efficacy with respect to research design skills, practical research skills, quantitative and computer skills, and writing skills. Items were derived from Phillips and Russell's (1994) 33-item Self-Efficacy in Research Measure. Secondly, the role of research mentoring was measured by the research mentoring experience scale (RMES). An 18-item short form (Kahn & Miller, 2000) of the Research Training Environment Scale (Gelso et al., 1996) used to measure global perceptions of the RTE of the interpersonal and instructional dimensions.

The third instrument used in the study involved research training environment revised (RTES-r) scale which measures students' perceptions on the research training environment. Interest in research was measured by the interest in research scale. The Interest in Research Questionnaire (IRQ) was developed by Bishop & Bieschke (1994). The IRQ is a 16-item 5-item Likert response scale that contains responses that range from 1 (very disinterested) to 5 (very interested). (Hollingsworth & Fassinger, 2002). The questionnaire intends to measure interest in research-oriented activities.

The respondents evaluate their degree of interest in a particular research task such as taking a research design course and analyzing data on a 5-point Likert scale ranging from 1 (very disinterested) to 5 (very interested).

An example of the items in the IRQ involves reading research from a journal article, conducting a literature review, analyzing data, and designing a study.

Lastly, a research knowledge assessment by Lambie (2012) was used to find out the level of research knowledge among the Ph.D. students. It covers eight subscales:

(a) literature review, (b) ethics in educational research, (c) research designs, (d) sampling, (e) data collection methodologies, (f) data analysis procedures, (g) data reporting and (h) scholarly writing practices. Each participant was given an answer sheet to circle the answers.

Additionally, a short demographic questionnaire was also distributed to the participants to find out general information on the participants such as age, gender, year of study and faculty.

Data Analysis

The information received from the survey packet was scored using the Statistical Package for Social Science (SPSS) software version 23. The objective of the study was to find out the level of research self-efficacy and its relationships with research mentoring, research training environment, interest in research, and research knowledge. Firstly, descriptive statistics, frequencies, mean and standard deviation were used to analyze the demographic factors of the respondents.

Secondly, Pearson's correlation coefficient was used to examine the relationship between research self-efficacy and research mentoring, research training environment, interest in research and research knowledge. Research self-efficacy was treated as the dependent variable while research mentoring, research training environment, interest in research and research knowledge were the independent variables. Thirdly, a multiple regression analysis was conducted to find out the impact of research mentoring, research training environment, interest in research and research knowledge on research self-efficacy.

Results

Reliability Analysis

Reliability analysis was employed to determine whether the items measuring research self-efficacy, research mentoring, research training environment and interest in research was a reliable measure of these variables. In order to measure the reliability of the items, Cronbach alpha's (α) statistics were calculated using Statistical Package for the Social Sciences (SPSS) version 23 (Cronbach, 1951). The observed value of .70 concludes the items included in the survey measured the intended variable (Nunnally, 1978).

The self-efficacy subscale consists of 12 items (α = .86). The Cronbach's alpha for the self-efficacy items was .86 and was found to be highly reliable (12 items; α =.86). The research training environment subscale consists of 18 items (α =.78).

The Cronbach's alpha for the research training environment items was .78. Items deleted were RTE1, RTE4, RTE5, RTE8, RTE9, RTE10, RTE13 and RTE17.

The interest in research subscale consists of 16 items (α =.86). The Cronbach's alpha for the self-efficacy items was .86 and was found to be highly reliable (16 items; α =.86). The research mentoring subscale consists of 28 items (α =.95). The Cronbach's alpha for the research mentoring items was .95 and was found to be highly reliable (28 items; α =.95).

Additionally, the research knowledge assessment was a 50 multiple choice assessment whereby the respondents were required to circle the correct answer on an answer sheet. Then, each respondent was given a score out of a total mark of 50. All items in the assessment was a dichotomous response with a choice of a, b, c and d. Therefore, the Kuder-Richardson Reliability Coefficients (KR20) was used to check the reliability of the 50 items in the RKA. Lord and Novick (1968) strongly proposed the KR20 as a better reliability estimate that KR21. A "Correct" answer was coded as 1.00 and an "Incorrect" answer was coded as .00 in Statistical Package for the Social Sciences (SPSS).

Table 2

Reliability Statistics for Research Self-Efficacy, Research Training Environment, Interest in Research, Research Mentoring Experience and Research Knowledge Assessment.

	Number of items	***Cronbach's Alpha***
RSE	12	.86
RTE	9	.78
IR	16	.86
RME	28	.95
RKA	120	.89

Note: RSE: Research self-efficacy, RTE: Research training environment, IR: Interest in research, RME: Research mentoring experience, RKA: Research knowledge

Table 2 illustrates that the research knowledge assessment subscale consists of 50 items (*a* =.89). The Cronbach's alpha for the research knowledge assessment was .89 and was found to be highly reliable (50 items, *a* =.89).

Correlation Analysis

The findings revealed that the difference in gender resulted in different levels of research self-efficacy while the students' diverse faculty had a difference in their perceptions of the research training environment. An apparent correlation was predicated between research self-efficacy, research training environment, interest in research, and research mentoring.

Table 3 presents the results of correlation analysis between research self-efficacy, research training environment, interest in research, and research mentoring.

Table 3

Correlation Analysis between Research Self-Efficacy, Research Training Environment, Interest in Research, Research Mentoring Experience, and Research Knowledge

	RSE	*RTE*	*IR*	*RME*	*RKA*
RSE	1	.36**	.46**	.31**	-.02
RTE		1	.37**	.49**	.21*
IR			1	.44**	.10
RME				1	.11
RKA					1

***Sig. at p <.01; * sig. at p <.05*

A moderate correlation existed between research self-efficacy and research training environment, $r = .36$, $p < .05$. A moderate correlation existed between research self-efficacy and interest in research, $r = .46$, $p < .05$. A moderate correlation existed between research self-efficacy and research mentoring experience, $r = .31$, $p < .05$. Lastly, a negative correlation existed between research self-efficacy and research knowledge $r = -.02$, $p > .05$.

A moderate correlation existed between research training environment and interest in research $r = .37$, $p < .05$. There was a moderate correlation between the research training environment and research mentoring experience where $r = .49$, $p < .05$ and a weak correlation between the research training environment and research knowledge where $r = .21$, $p < .05$.

A moderate correlation was found between interest in research and research mentoring experience where $r = .44$, $p < .05$. However, there was no correlation between interest in research and research knowledge where $r = .10$, $p > .05$. Finally, there was no correlation between research mentoring and research knowledge where $r = .11$, $p > .05$.

Table 4 presents the results of the mean square and F value multiple regression analysis.

Table 4

Impacts of Research Training Environment, Interest in Research, Research Mentoring Experience, and Research Knowledge on Research Self-Efficacy

Predictor	***Research self-efficacy***
RTE	.23*
IR	.36*
RME	.05
RKA	-.11
R Value	.51
R^2 Value	.26
Adjusted R^2	.24
F Value	10.32

*Note: *p<.05;*
RSE: Self-efficacy, RTE: Research training environment, IR: Interest in research, RME: Research mentoring experience, RKA: Research knowledge

A significant regression equation was found (F (4,115 = 10.323, p < .00) with an R^2 of .26. Interest in research contributed to 36 percent of the variance of changes on research self-efficacy. The result showed that research training environment (β = .23; p = .019) and interest in research (β = .36; p = .00) had significant impacts on research self-efficacy. Unfortunately, research mentoring experience (β = .05; p = .62) and research knowledge (β = -.11; p = .20) had no impact on research self-efficacy. The results of research training environment, interest in research, research mentoring experience, and research knowledge on research self-efficacy are presented in Table 5.

Table 5

Impacts of Research Training Environment, Interest in Research, Research Mentoring Experience, and Research Knowledge on Research Self-Efficacy

Predictor	*Research self-efficacy*
RTE	.23*
IR	.36*
RME	.05
RKA	-.11
R Value	.51
R^2 Value	.26
Adjusted R^2	.24
F Value	10.32

*Note: *p<.05; RSE: Self-efficacy, RTE: Research training environment, IR: Interest in research, RME: Research mentoring experience, RKA: Research knowledge*

Research training environment, interest in research contributed to 26 percent of the variance of changes in research self-efficacy. All predictors except research mentoring experience and research knowledge had a significant impact on research self-efficacy with a range of $.23 \leq \beta \geq .36$ at $p < .05$. Therefore, the null hypothesis was rejected as there was a positive impact of the research training environment and interest in research on research self-efficacy and a negative impact of research mentoring experience, and research knowledge on research self-efficacy.

Table 6 presents the summary of findings for all research hypothesis set in the study.

Table 6

Summary of Findings for Research Hypothesis

Hypothesis	*Statement*	*Findings*
Ho1	There is a positive relationship between research self-efficacy and research mentoring experience.	**Accepted**
Ho2	There is a positive relationship between research self-efficacy and research training environment.	**Accepted**
Ho3	There is a positive relationship between research self-efficacy and interest in research.	**Accepted**
Ho4	There is a positive relationship between research self-efficacy and research knowledge.	**Rejected**
Ho5	There is a positive impact of research mentoring, research training environment, interest in research, and research knowledge on research self-efficacy.	**Rejected**

Note: Ho: Hypothesis

Discussion, Conclusion and Recommendations

In conclusion, this study was the first to examine the specific constructs of research self-efficacy such as the perceptions of the research training environment, research mentoring, interest in research, and research knowledge within a sample of Ph.D. students in a local university. The current study was initiated to provide an original contribution to the literature in the education field as research self-efficacy is the most popular and predictive construct in behavior research.

Self-efficacy ratings are highly predictive of behavior as the ratings reflect a broad range of predictive motives (Williams & Rhodes, 2014). One of the purported strengths of the self-efficacy is the one that provides the reasoning as to why individuals have the tendency to engage in specific behaviors rather than merely just predicting the behavior. The self-efficacy theory by Bandura (1977) clearly explains that self-efficacy determines the behavior of an individual and the setting of relevant goals, and challenges are essential towards sculpting the right behavior.

A few significant findings were drawn from the study. Generally, the results suggested that Ph.D. students possess moderate levels of research self-efficacy and low levels of research knowledge. On the contrary, the students have shown high levels in the research training environment, research mentoring and interest in research. Remedial actions such as online delivery and including the research as a module in the Ph.D. study was essential to provide additional assistance to the students to improve their research knowledge. Other viable suggestion included peer modeling which serves as a solution towards improving the research knowledge of the Ph.D. students. Scaffolding through mentoring and the opportunity for the students to present in academic conferences and publish their research skills could help to increase the student's research self-efficacy (Wyatt & Dikilitas, 2015).

Secondly, positive correlations were found between the research training environment, research mentoring, interest in research, and research self-efficacy. Other than that, interest in research and research training environment was accountable for twenty-six percent of the variation in research self-efficacy. The level of interest in research enabled the Ph.D. student to actively conduct research. The self-fulfilling prophecy method was recommended to the students, in which good students convey to their peers to the belief that they are capable in conducting research and likely to excel; and the peers, in turn, become more confident and believe they will excel in research and continuously achieve higher levels of performance. Self-efficacy beliefs do not form in isolation but are influenced by the forces that shape the understanding and intensity of the belief. Mutual cooperation between the student and the faculty involved was important to ensure success in actively fostering and improve the research self-efficacy, research training environment, interest in research, research mentoring, and research knowledge of the students.

Implications for self-efficacy theory

The self-efficacy theory explains that reciprocal interactions between personal, environmental and behavioral factors play an important role in shaping the desired behavior of an individual. Perceived self-efficacy influences an individual's choice of activities and behavioral settings, how much effort they spend, and how long they will persist in the face of obstacles. Understanding research self-efficacy is important to provide guidance to scholars on the deficiency of status quo, improve and evaluate university education.

Overall results have shown that the students possess a moderate level of research self-efficacy. On the positive side, students have shown high levels of the research training environment, interest in research and research mentoring. Correlation findings have shown a positive relationship between research self-efficacy, research training environment, interest in research, and research mentoring. Negative relationships were found between research self-efficacy and research knowledge. The implication of self-efficacy was useful for selection decisions where students with better confidence in research are selected to represent the university in academic conferences and presentation.

Besides, the theory also enabled the faculty to carefully select students with high research self-efficacy to be groomed as future researchers. The accurate selection of student results in higher productivity in research for the university. The theory was also useful in goal setting where specific goals set towards the completion of research will ensure that the students graduate on time and not extend their candidature period.

Implications for practices in research

The findings served as an essential input to the faculty as it provided robust understandings on research self-efficacy and research knowledge that the Ph.D. student possessed, level of interest and mentoring, and their perceptions of research training environment throughout their study. Furthermore, the study was the first to incorporate the few constructs relevant to the area of research self-efficacy.

The findings on the perception of the research training environment provided a better understanding of the current research training environment and all the forces that were within the faculty. It served as an indicator to inform whether the facilities, peers and support staff should be modified to improve the research experience of the Ph.D. student. The moderate level of research self-efficacy and low levels of research knowledge has shown that the faculty must take initiatives to improve the confidence level and provide essential support to the Ph.D. students. Remedial classes, online delivery of research courses, and incorporation of a research module in the program could serve as a viable solution to improve the research self-efficacy and research knowledge of the students.

High interest in research was evident among the respondents in the study and this helped the faculty to identify the potential student for succession planning in research in order to sustain for the future developments in the faculty. Additionally, the students also had rated their Ph.D. supervisors highly. This was a very encouraging and positive finding for the faculty as the commitment of the supervisors were appreciated by the students. Nevertheless, the faculty must continue to strengthen the research clusters within the academic staff and provide the highest level of mentoring to the students.

The findings from the study play an important role to create an innovative ecosystem that facilitates research and development by understanding the basics of research confidence amongst the students. By detecting the flaws in the level of research confidence which affects the research behavior of the students, it enables the faculty to improvise the current situations to facilitate a better environment towards research.

Lastly, the findings from the study provide insights for Ph.D. preparation programs to continue to develop and prepare students for success. It provides beneficial information to assist universities to develop and design policies to encourage and foster research amongst their Ph.D. students. It helps to further enhance the success rate and quality of the Ph.D. programs offered by the university.

Implications for the Ph.D. student

The findings largely contribute to the gaps in the studies in research self-efficacy and support Ph.D. students' development in research. The findings from the study have several important implications for Ph.D. student. Results showed that students possessed moderate levels of research self-efficacy and low levels of research knowledge but high levels of interest in research, research mentoring, and research training environment. Research training environment plays an important role in shaping the research behavior and attitudes of the student as it encompasses a wide range of forces such the faculty, students, and support staff. The findings serve as an important indicator for the student as he/she may improve on the deficiencies in the identified area. Besides, findings were very useful for ambivalent students who have just enrolled in the Ph.D. programs as a positive experience in the training environment contributes to greater self-efficacy. The incremental development of research self-efficacies is crucial in the early part of their career.

Limitations

A few limitations were identified in the study. The current study was non-experimental in design; the investigation employed an ex-post-facto or correlation research design. For studies that are not by nature experimental, a cause and effect (or causality) relationship cannot be inferred as a result since the research is related to the associations between the variables (Sproull, 1995; Tuckman, 1972).

The study did not involve random sampling but rather employed stratified sampling because the sample of the Ph.D. students was drawn from students in the applied arts faculties. Therefore, the results may not be generalized to other fields of study. In addition, the study was ex-post-facto in design. Ex-post-facto suggests "what was done afterward." Kerlinger (1964) defined ex post facto research as a "research in which the independent variable or variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables.

Recommendations for future research

The following are several suggestions for future areas of investigation related to the present study. It is prescribed that the current study be replicated over a period of time which permits a pre and post-study for the Ph.D. students and extend into the participants' post-doctoral work. Longitudinal research design would allow students' progress to be tracked from the beginning of their programs through completion, and into the professional arena. The inclusion of the constructs investigated in the study with selected demographic variables such as gender provides a possible new finding in research self-efficacy. Findings would provide valuable information on gender as a potential factor which influences research self-efficacy and contributes to what is, at the present, a paucity of literature. Further research on research self-efficacy and gender present new ideas for research as women consistently underrated their self-confidence when compared to men (Edward & Hopkins, 2005; Roest & Kleiner, 2010).

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