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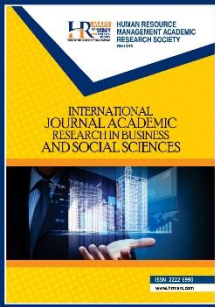
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Prevalence of Mixed Methods Research in Education Journals

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Abstract

None of the research methods executed in various disciplines is error free. However, the use of mixed methods research (MMR) has proven to reduce research errors hence, increasing its validity and reliability. As such, the significance of MMR research in education research has been increasing from time to time due to its strengths overriding qualitative and quantitative paradigms when each is singly applied. However, education researchers need to be competent and determined to apply mixed methods. This study examine the prevalence of MMR articles published in three peer-reviewed online education journals (n=333) in period of ten year from 2004 to 2013. Findings from the study suggest that mixed methods research account for 28% of articles published in the three journals over one decade of review. The QUAL-quan design dominates the MMR articles constituting 20%. Importantly, the results indicate that there is an increase of prevalence of mixed methods research articles in education over time. Though, the prevalence rate is very low and not constant year wise. Our findings are limited to the selected three education journals, whereby studies on other educational journals of different disciplines might result into different conclusions.

Introduction

Despite the ongoing contentions among researchers on the use of mixed methods in research (MMR), studies indicate that there is an increasing acceptance of this research design (Cameron, 2011; Johnson, 2013). There are researchers who are qualitative believers who oppose the quantitative paradigm followers (Lund, 2012). Each of the paradigm claims to be superior to the other. While quantitative approach is proved to be better for generalisability and objectivity (empiricism) research, qualitative research is credited for deep understanding of the phenomena than quantitative research (Interpretivism). However, none of them is a free error approach, hence calling for the third methodology to curtail their limitations. Therefore, to address the shortcoming of both quantitative and qualitative approach a mixed method had to evolve (Caruth, 2013).

According to Creswell (2003); Darwish (2016), mixed method involves mixing quantitative and qualitative research methods, approaches, or other paradigm characteristics. However, the appropriateness of this mixed method will depend on the research questions and the situation of practical issues a researcher faces. None of the three methods is less important in research but the situation determines which approach is suitable. Moreover, knowledge of the researcher employing mixed method is paramount due to complexity of the method which requires care to avoid ambiguousness.

A Recent Historical Underpinning Mixed Method Research

Until the 21st century quantitative research paradigm was overriding. In 1970s, qualitative approach emerged to counter the hegemony of quantitative design. These two approaches were executed separately having different philosophical views and goals. While the goal of quantitative approach is to propose hypothesis to be accepted or rejected, the goal of qualitative is to produce hypothesis (Cronholm, & Hjalmarsson, 2011). Since each of the approaches claimed to be superior to the other, there emerged a group of “purists” contenting that the two could not be used together due to their incompatibility thesis. The paradigms are argued to vary ontologically, epistemologically, axiological and rhetorically. Nevertheless, the combination of both is accredited to its ability to use the strength of each and diminish their setbacks (Guba, 1990; Tashakkori & Teddlie, 1998). In this light, the evolvement of the third approach of mixed research became necessary, and Guba initiated the dialogue in 1970s, 1980s and 1990s. Thus, at this time mixed method became the third methodological champion of peace within the paradigm war between quantitative and qualitative advocates (Symonds and Gorard, 2010).

Today MMR has been given many names such as: blended research (Thomas, 2003), integrative research (Johnson & Onwuegbuzie, 2004), multimethod research (e.g., Hunter & Brewer 2003 in Tashakkori and Teddlie 2003; Morse, 2003), triangulated studies Sandelowski, 2003), ethnographic residual analysis (Fry, Chantavanich & Chantavanich, 1981), and mixed research (Johnson, 2006; Johnson & Christensen 2004), to mention some. On the other hand, Johnson et al (2007) define mixed method research as an intellectual and practical synthesis base on qualitative and quantitative research. MMR offers a powerful third paradigm choice that often will provide the most informative, complete, balanced and useful research results. Additionally, MMR can be classified as quantitative-dominant, qualitative-dominant or equal-status mixed methods. To emphasize more, Morse (1991-2003) split the approaches as QUAN-qual, QUAL-quant, and QUAN-QUAL, respectively. Thus, each design depends on the type of research, the researcher’s situation and competence to execute this paradigm.

Furthermore, two triangulation methods namely; simultaneous or sequential, were identified by Morse (1991). According to the author, simultaneous triangulation refers to the concomitant use of both qualitative and quantitative methods. In this case the interaction between during data collection of the two sources is limited. However, the findings at the data interpretation stage complement each another. Sequential triangulation, on the other hand, is applied when the findings of one paradigm are essential for planning the next approach. More important, the nature of the study a researcher is carrying out dictates the design to be chosen.

Table 1 MMR Design Matrix

		Status and order decision		
			Concurrent	Sequential
Paradigm decision	Emphasis	Equal status	QUAL + QUAN	QUAL → QUAN QUAN → QUAL
		Dominant status	QUAL + quan QUAN + qual	QUAL → quan qual → QUAN QUAN → qual quan → QUAL

Note. “quan” stands for quantitative, “qual” stands for qualitative, “+” stands for concurrent, “→” stands for sequential, capital letters denote high priority or weight, and lower case letters denote lower priority or weight.

Source: Muskat, (2012):11. Notation based on Morse 1991.

NB: From table 1 design of this study therefore, is found to right on the dominant row i.e. QUAL → quan.

Since the formal inauguration MMR around 2000 after a long battle between the quantitative and qualitative advocacies, its use has been accelerating over time in devised disciplines of study (Miller, 2011). Despite the variation of basis to apply MMR, scope expansion and offsetting shortcomings of one approach alone are pointed as general fundamentals (Blake 1989; Rossman and Wilson 1991). Thus, researchers need to utilize the advantages of MMR so as increase validity and reliability of their researches. The application of MMR is not even to all disciplines of study. Hence, more advocacies are required to raise awareness and encourage researchers to use MMR. Studies by Molina-Azorin (2010); Ross and Onwuegbuzie (2012); Caruth, (2013); and Shulze and Kamper (2009), to name a few, have indicated that the application of MMR in education research is not at the prevalence expected, despite its advantages outnumbering the advantages of quantitative and qualitative approaches when each is used as a single paradigm. Further, it is revealed that qualitative research was accepted in education studies in 1980s after an extensive “paradigm wars” fought between advocates of the contenting paradigms research reached a new peak (Creswell, 2013). Since then, enough has not been done on studies focusing the prevalence of MMR in the field of education, therefore, this call for more to be done in the area.

Purpose and Objective of this Study

Although researchers have documented the prevalence rate of mixed methods research in other fields, few articles from other journals have been published examining the prevalence of mixed methods education research. Recently, Molina-Azorin 2010; Miller, 2011; Ross and Onwuegbuzie 2012 and Caruth, (2013), examined the prevalence of mixed methods articles in interdisciplinary education journals. These studies documented an average of less than 25% of MMR prevalence among all reviewed articles. Indeed, the rate of prevalence is still very low given the importance of the paradigm and the field of education itself. This study therefore, is important because it provides additional information regarding the extent to which education articles are keeping abreast of MMR.

Thus, the purpose of this study is to examine the prevalence of MMR application in education research articles. Three international peer-reviewed education journals are selected and the published articles in 10-year panel are examined to ascertain the prevalence. To accomplish this main objective the following questions guides this study:

- [i] How many MMR in comparison with other research methods articles are published in the selected three international education journals?
- [ii] How does the number of MMR articles vary by journal and by year?
- [iii] Which MMR design was more prevalent among the identified MMR articles by journal and by year?

We select three highly ranked peer-review education journals namely; the Journal of Teaching in Higher Education (JTHE), the International Journal of Education and Development (IJED), and Journal of Language Learning and Technology (JLLT). In each journal, at least 100 articles are assessed to ascertain the prevalence use of MMR. We employ a sequential mixed approach (QUAN-Qual) to determine the prevalence of MMR use in each article and compare among them. In the next section two, we present the related literature review followed by research methodology in section three. Section four present results of findings and analysis, and finally the section provides information for conclusion and recommendations in section five.

Literature Review

Mixed methodology today is a natural complement to traditional qualitative and quantitative research (Johnson and Onwuegbuzie, 2004). Since the end of paradigm war, MMR has gained acceptability and credentials to many researchers in various disciplines. To emphasize more, Datta (1994) contents that MMR is inevitable in higher practical social science fields like education due to the fact that the practical context demand for both generalizability and particularity.

Molina-Azorin (2010) conducted a study on the use of mixed method in interdisciplinary educational journals to ascertain the prevalence of the method in publications. Three popular Journals were selected and reviewed in range of six years from 2005 to 2010. The study also employed a mixed method where both quantitative qualitative data were used. The findings from the study revealed variability of mixed method prevalence rates among the journals. Based on this study it is also affirmed that there several advantages obtained from execution of a mixed method research. The main purpose of mixed method is to benefit from the strengths of both qualitative and quantitative methods and minimize the short comings. Because of such befits, many studies in education are reported to have higher percent of mixed method application.

Another study by Miller (2011), focusing on adoption of mixed method research in doctor of business administration (DBA) theses reveal that most PhD scholars have realized the essence of MMR and they are increasingly applying it. However, most researchers did not state in the application of MMR but in practice the design was observed to be applied. It is evident from this study that it is not only the issue of being positivist or purists that make researchers not to include MMR in their studies, but also capability to use it is another hurdle. The same is supported by Caruth (2013), arguing that Mixed method research is not exhaustively used by most researchers despite its embedded benefits since the knowledge is yet to be demystified. So, exposing the knowledge on mixed method research could encourage researchers to employ the design in their future studies.

Contrary to observations of other study findings that there is an increase of MMR prevalence, a study by Ross and Onwuegbuzie (2012) has revealed the opposite. They examined the prevalence of MMR in mathematics education articles published in two peer reviewed journals of mathematics education in a panel of five years from 2002 - 2006. Findings from this study suggested that 31% of mixed methods prevalence was observed among the identified empirical articles. These results however, indicated a decline by 10% from the finding observed in preceding five years time.

In summary, MMR application in education disciplines is increasing overtime though at a low pace. On the other hand, much has not been done in terms of research to find out its prevalence in various education disciplines through education journal survey. In addition, lack of knowledge and complexity of the method contributed various factors such as time consuming are some of the limitations to its use. Arguably, more academic publicity to researchers is required so as have a forward direction in terms of MMR prevalence in education research. The decline of education efficiency and quality at all levels has been reported worldwide. The unprecedented demand increase of education service which does not match with the existing infrastructure and other resources is among the reasons for this crisis. As such, more valid and reliable research methods are required to address education challenges facing many countries today. Therefore, MMR is the most appropriate paradigm to address education challenges due to its quality of error reduction.

Methodology

This study executes a two stage sequential mixed methods in the process of ascertaining mixed methods articles and decide their main features. In phase one, a qualitative approach is applied through manual search with an intention of determining whether each identified article signify an empirical, non-empirical, qualitative, quantitative or mixed methods study. The information presented in each article which are used for analysis include; title, abstract, keywords, introduction, literature review, methods, results, discussion and conclusions. The data collected are presented in a table form for each respective journal and year wise. Tables also include different titles for easily interpretation.

Data

This study examine 333 journal articles published in JTHER (n = 105), IJED (n =112), and JLLT (n = 116) downloaded from three peer-reviewed education journals. We chose the three journals because of their high ranking among education Journals. The selection of articles is for a range of 10 years from 2004 to 2013. The time range was long enough to have good trend observation of MMR prevalence for each education journal. To obtain a good sample we purposely selected published articles (excluding book reviews and editorials, over a span of one decade. Free downloading of articles from the selected journals is another criterion for selection.

Determination of the number of articles in education journals utilizing MMR was followed by calculation of the annual and total percentage of MMR usage for each individual journal in a span of 10 years. Moreover, similar calculation was done to all three journals combined, for the year 2004 – 2013. These values are used to describe how the prevalence of MMR in education research changes over time and to compare this Data Analysis.

Empirical Results and Discussions**Table 2 Comparison of Articles in JTHE, IJED and JLLT Journals (2004-2013)**

JOURNAL	Total No. of Articles	No. of Non-Empirical Articles	Empirical Articles	Qun	Qual	Mixed methods
JTHE	105	9(9%)	96(91%)	8(8%)	64(61%)	24(23%)
IJED	112	17(15%)	95(85%)	11(10%)	51(46%)	33(30%)
JLLT	116	15(13%)	97(84%)	15(13%)	45(39%)	36(31%)

Source: summarized from Appendices 4a - 4c.

As it can be seen in Table 2 in all the three articles JTHE, IJED and JLLT are dominated by qualitative articles 64(61%), 51(46%) and 45(39%) respectively for all ten years of review. However, JLLT is the most important type of article in all the ten years of review compared to other article types. Mixed method, is second type article in importance for all the three journals, 24(23%), 33(30%) and 36(31%) respectively. The third type article in importance is the non-empirical articles for the two journals JTHE (9, 9%) and IJED (17, 15%). The last type article in importance for the first two reviewed journals is quantitative articles with 8(8%) and 11(10%) respectively. However, non-empirical and quantitative type articles in JLLT journal have equal importance with 15 (13%) each.

Since the major purpose of the study is to examine the prevalence of mixed method articles in the three reviewed journals, table three below provide the number of mixed method articles for each journal and year wise with their percentages. Moreover, the annual total is provided for all the ten years of review for easily trend recognition.

Table 3 Percentages of MMR Studies in JTHE, IJED and JLLT combined (2004 - 2013)

YEAR	JTHE	Percent	IJED	Percent	JLLT	Percent	Annual Total
2004	1/10	10%	1/10	10%	1/12	8%	3/32
2005	2/11	18%	2/12	17%	4/14	29%	8/37
2006	1/12	8%	3/11	27%	5/11	45%	9/34
2007	2/10	20%	3/10	30%	4/11	36%	9/31
2008	0	0%	7/13	54%	3/11	27%	10/24
2009	2/11	18%	2/12	17%	5/11	45%	9/34
2010	1/10	10%	5/12	42%	4/12	33%	10/34
2011	6/11	55%	4/12	33%	3/12	25%	13/35
2012	5/10	50%	3/10	30%	3/10	30%	11/30
2013	4/10	40%	3/10	30%	5/12	42%	12/32

Source: Summarized from Surveyed data in appendices 1-3

From table 3, there are 94(28%) MMR out of 333(100%) articles reviewed for the entire time of one decade from the three selected international education journals. Furthermore it is show that JLLT has the highest total number of mixed method articles (31%) followed by IJED (29%) and JTHE (14%) have the lowest total number of MMR articles. However, the total number of

mixed methods of all the three journals is record a slightly increase year wise. Of all the ten years, annual total increase in 2008 is the highest with 42% followed by 2013 (41%). Generally, the trend of mixed methods articles publication in the selected journals increase year wise though at none constant rate as indicated in Figure 1.

Figure 1: The Trend of MMR in JTHE, IJED and JLLT combined (2004 - 2013)

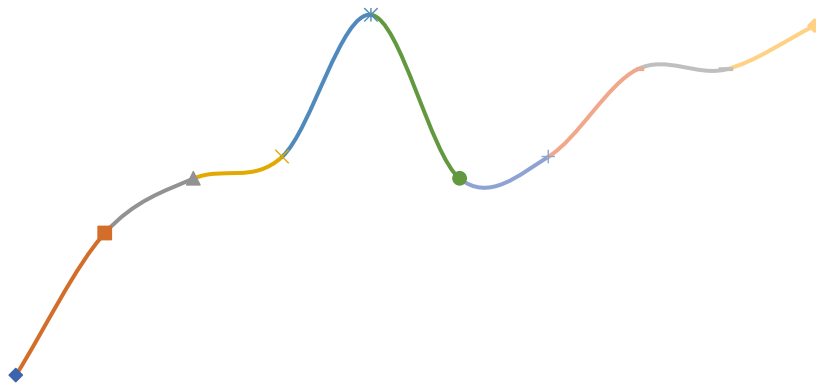


Table 4a Percentages of MMR Design Emphasis in JTHE

Year	n	QUAL-quan	QUAN-qual	QUAL-QUAN
2004	1	100%	0%	0%
2005	2	100%	0%	0%
2006	1	100%	0%	0%
2007	2	50%	50%	0%
2008	0			
2009	2	100%	0%	0%
2010	1	0%	0%	100%
2011	6	67%	33%	0%
2012	5	80%	20%	0%
2013	4	100%	0%	0%

Source: Summarized from Surveyed data in appendices 1-3

Table 4b Percentages of Mixed Methods Research Design Emphasis in IJED

Year	n	QUAL →quan	QUAN →qual	QUAL →QUAN
2004	1	100%	0%	0%
2005	2	100%	0%	0%
2006	3	67%	33%	0%
2007	3	100%	0%	0%
2008	7	71%	0%	29%
2009	2	100%	0%	0%
2010	5	20%	80%	0%
2011	4	75%	25%	0%
2012	3	67%	0%	33%
2013	3	0%	100%	0%

Source: Summarized from Surveyed data in appendices 1-3

Table 4c Percentages of MMR Design Emphasis in JLLT

Year	n	QUAL-quan	QUAN-qual	QUAL-QUAN
2004	1	100%	0%	0%
2005	4	50%	50%	0%
2006	5	80%	20%	0%
2007	4	100%	0%	0%
2008	3	100%	0%	0%
2009	5	100%	0%	0%
2010	4	100%	0%	0%
2011	3	100%	0%	0%
2012	3	33%	67%	0%
2013	5	60%	40%	0%

Source: Summarized from Surveyed data in appendices 1-3

Based on Tables 4a - 4c the dominant mixed method design is observed to be a qualitative-dominant (QUAL →quan) followed by quantitative-dominant (QUAN→qual) in all the ten years of review. In QUAL→quan design the purpose of mixed method is qualitative methods are used to help develop quantitative measures and instruments to interpret results, whereas, in QUAN→qual design the purpose is that qualitative methods are used to help explain quantitative findings (Creswell et al, 2003). Additionally, it is observed that only 5(5.3%) mixed method articles from the three journals their design is equivalent (QUAL-QUAN). This equivalent status implies that qualitative and quantitative methods are used equally and in parallel (Morse, 1991). There one article in the first journal and three articles in the second journal which employed equivalent mixed methods design, but none of the articles from the JLLT adapted an equivalent mixed methods design.

It clearly shown that article authors highly valued the advantages of mixed methods by transforming qualitative data into quantitative interpretation for better understanding. In this way it was easily to attain better desired results than when only qualitative design could have

been used. However, the nature of the studies relating to the three journals might have contributed to dominance of quantitative design. The selected three (JTHER, IJED and JLLT) journals have specific issues to address in education namely; teaching in higher education issues, education and development and language learning and technology respectively. These specific areas of journals' jurisdiction, might have limited mixed methods and their designs to be executed. For instance, data obtained from learning, teaching and education is participant based which are mainly interpreted qualitatively, making difficult to apply mixed methods (Johnson and Onwuegbuzie, 2004).

Conclusion

Our purpose in this study is to examine the prevalence of mixed methods in articles published in three selected education journals (JTHER, IJED and JLLT). The findings of this study are similar to that of Ross and Onwuegbuzie (2012), who assessed the prevalence of mixed methods in Mathematics education.

Focusing on the first question on the number of MMR articles published in the three selected international journals of education is that JLLT has the highest total number of mixed method articles (31%) followed by IJED (29%) and JTHER(14%) having the lowest published mixed methods article for the ten years of review. However, the annual total percent for all three journals is observed to be 28% in ten years time from 2004 to 2013. More important, there is an increase of MMR application year wise for all the three journals, though not at a constant rate. As indicated in Figure 1. Specifically, we find that qualitative-dominant MMR design (QUAL-quant) dominated the observed articles in all the three journals. The nature and specificity of articles accepted for publication by the selected journals, might have contributed to such findings. Conversely, quantitative-dominant (QUAL-quant) and equal status design are not equally significant to authors in the three journals in the panel review of 2004-2013.

In conclusion, this study reveals the increasing role of mixed methods research design in education research studies. Despite the observed prevalence of MMR in the selected education journals is slightly increasing overtime, the rate of increase is very low and not constant. Therefore, given the advantages of MMR design researchers are appealed to employ this paradigm provided their research questions are in line with the MMR approach, they are confident enough to employ mixed methods and there should be purposeful application and not increasing number of methods. Importantly, MMR paradigm needs to be advocated to education researchers to enhance their articles.

Recommendation for Further Study

The limitation of this study is that, this study considers only published journal articles in only three selected journals, excluding books and conference proceedings. Although the current study attempts to extend the knowledge of the application of mixed methods research in education research, much remains to be learned. It would be significant to assess the hurdles facing authors of education research when use MMR design and ascertain the competences to MMR. Moreover, an analysis of the use and application of mixed methods research in other education journals in other than those examined in this study and could expand upon the research reported here.

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Appendices**Appendix 1****Journal of Teaching in Higher Education (JTHE)**

Year	N	Non-		Emp	%	Quan	%	Qual	%	MMR	%
		Emp	%								
2005	11	0	0.0%	11	100.0%	1	9.1%	8	72.7%	2	18.2%
2006	12	2	16.7%	10	83.3%	1	8.3%	8	66.7%	1	8.3%
2007	10	1	10.0%	9	90.0%	1	10.0%	6	60.0%	2	20.0%
2008	10	1	10.0%	9	90.0%	2	20.0%	7	70.0%	0	0.0%
2009	11	0	0.0%	11	100.0%	0	0.0%	9	81.8%	2	18.2%
2010	10	1	10.0%	9	90.0%	1	10.0%	7	70.0%	1	10.0%
2011	11	1	9.1%	10	90.9%	1	9.1%	3	27.3%	6	54.5%
2012	10	2	20.0%	8	80.0%	0	0.0%	3	30.0%	5	50.0%
2013	10	0	0.0%	10	100.0%	0	0.0%	6	60.0%	4	40.0%
Total	105	9	8.6%	96	91.4%	8	7.6%	64	61.0%	24	22.9%

*Thus, emp implies empirical, Quan -quantitative, Qual- qualitative and MMR stand for mixed method research

Appendix 2**International Journal of Education and Development (IJED)**

Year	N	Non-		Emp	%	Quan	%	Qual	%	MMR	%
		Emp	%								
2004	10	0	0%	10	100%	0	0%	9	90%	1	10%
2005	12	4	33%	8	67%	1	8%	5	42%	2	17%
2006	11	3	27%	8	73%	0	0%	5	45%	3	27%
2007	10	2	20%	8	80%	1	10%	4	40%	3	30%
2008	13	1	8%	12	92%	1	8%	4	31%	7	54%
2009	12	5	42%	7	58%	1	8%	4	33%	2	17%
2010	12	0	0%	12	100%	1	8%	6	50%	5	42%
2011	12	1	8%	11	92%	4	33%	3	25%	4	33%
2012	10	0	0%	10	100%	1	10%	6	60%	3	30%
2013	10	1	10%	9	90%	1	10%	5	50%	3	30%
Total	112	17	15%	95	85%	11	10%	51	46%	33	29%

Appendix 3**Journal of Language, Learning and Technology (JLLT)**

Year	N	Non-Emp	%	Emp	%	Quan	%	Qual	%	MMR	%
2005	14	2	14%	12	86%	2	14%	6	43%	4	29%
2006	11	1	9%	10	91%	2	18%	3	27%	5	45%
2007	11	4	36%	7	64%	1	9%	2	18%	4	36%
2008	11	3	27%	8	73%	2	18%	3	27%	3	27%
2009	11	1	9%	10	91%	1	9%	4	36%	5	45%
2010	12	2	17%	10	83%	2	17%	4	33%	4	33%
2011	12	0	0%	12	100%	2	17%	7	58%	3	25%
2012	10	0	0%	10	100%	0	0%	7	70%	3	30%
2013	12	0	0%	12	100%	2	17%	5	42%	5	42%
TOTAL	116	15	13%	97	84%	15	13%	46	40%	36	31%