Factor Structure of Research Attitude among Graduate Students in Education

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Abstract

Dropping survivability and rising drop-out rates in the graduate school is attributed to the demands that come along with research-related requirements. Graduate students tend to withdraw from their studies when confronted with such requirements. This act of succumbing to the challenge is primarily due to a negative mindset. An understanding of students' views towards research is essential for teachers in facilitating research activities in the graduate school. One major concern, however, is the scarcity of tools with established psychometric properties. Therefore, this study aimed to develop an instrument that accurately gauges students' attitude towards research. Internal consistency and factor structure of the Research Attitude Inventory (RAIn) was assessed. A pool of items was initially constructed and was administered to a development sample composed of Master's and Doctorate degree students. Results show that the RAIn is a reliable measure of research attitude ($k=41$, $\alpha_{max} = 0.894$). Principal component analysis using orthogonal rotation with Kaiser normalization identified four underlying factors of research attitude, namely predisposition, purpose, perception, and preparation.

Keywords: scale development, research attitude, graduate education, principal component analysis

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Introduction

Research is a term loosely used in everyday speech to describe a multitude of activities, such as collecting masses of information, delving into esoteric theories, and producing wonderful new products (Walliman, 2005). Calmorin and Calmorin (2007) define research as the scientific study of trend or event which involves careful collection, presentation, analysis and interpretation of data or facts that relates man's thinking with reality. The Oxford Encyclopedic Dictionary defines research as the systematic investigation into the study of materials, sources, etc. in order to establish facts and reach new conclusions; it is an endeavor to discover new or collate old facts, etc. by the scientific study of a subject or by a course of critical investigation. For the graduate school student in the master's and the doctorate levels, research is nothing but an academic requirement that would bring them a step higher in the academic ladder. This notion is based on the fact that most graduate programs today require students to submit an acceptable thesis (for master's level) or dissertation (for doctorate level) prior to the confirmation of the degree.

Research, as a part of academic requirement for graduate degrees, traces its history before the end of the 13th century in Paris when candidates for higher education defended their theses (Calmorin,1994). A thesis is a report of the process and results of research, extending from a central proposition, hypothesis, or problem to a definite generalization growing out of facts while a dissertation is a thesis covering a limited range which further must be a contribution to knowledge.

Almack (1930) emphasizes that research as an academic requirement is a result of independent work. Such requirements are consistent with the theory of higher education. As universities are now organized, three fairly definite stages in the educational process are recognized: period of the mastery of knowledge; period of mastery of the techniques by which knowledge is tested and additions are made to the sum total; and period of discovery or research (Almack, 1930).

Research is one of the things that every graduate school student should be ready for. Students in higher or further education, whether full- or part-time, may be required to complete research projects of one kind or another. Requirements that involve independent research are inevitable in most, if not all, academic courses. In some instances, the research project forms a relatively minor part of the course; in others, the project is virtually the whole basis on which award is made (Denscombe, 2002; Sharp, Peters, & Howard, 2002;). On top of that, thesis or dissertation writing comes as the ultimate universal requirement for a student to finally earn a higher degree. In fact, people judge a recently graduated master's or doctorate by his or her research (Azuma, 2003).

The scenario manifests that a student's admission to a graduate program comes with an assumption that he can do independent research. Graduate school administrators argue that the assumption is evidenced by documents that the students submitted prior to admission to the program. Unfortunately, in most cases, the assumption proves otherwise.

Most students in the graduate school have a phobia for research and thesis writing. Some say it is difficult to write a thesis. Others are afraid of the long process related

to the research undertaking (Garcia, Nuevo, & Sapa, 2007). According to Barnes (1995), the students' lack of interest is due to their view that research is complex, ambiguous and open to doubt. Consequently, they are not driven on by curiosity and may perceive doing a research more as a chore than a process that fosters the personal development of the student (Sharp, Peters, & Howard, 2002). Phillips and Pugh (2000) say that the new graduate school students often have the idea that people who possess higher degrees are outstandingly brilliant. This idea inhibits their own development as they are equally sure that they are not outstandingly brilliant and therefore cannot really expect to be awarded higher degrees. Similarly, if they actually read any completed theses or dissertations, they often emerge convinced that they would never be able to write anything even remotely resembling such a document either in length or quality.

As a result, research is often blamed for the dropping survivability rate and rising drop-out rate among graduate schools. Graduate school students tend to take halt after their academic requirements and delay their thesis or dissertation writing; worse, they take the risk but fail and soon forget their dreams of obtaining a higher degree all together. Meanwhile, other students who fortunately are given research tasks earlier on in their academic courses get tired of the arduous tasks entailed by the requirement and eventually drop out of school for reasons that they cannot cope with what is expected.

In a longitudinal study of doctoral programs from 1958 to 1988, Bowen and Rudenstine (1992) report that all those who enter a doctoral program, only about half actually complete their program (Faghihi, Foroozandeh, Ethington, & Corinna, 1996). This extensive study examined English, History, Economics, Political Science, Mathematics, and Physics doctoral programs at ten major research universities in the United States of America. A similar finding was divulged by a recent six-year executive report submitted by one state university in the Cordillera Administrative Region to the Commission on Higher Education. Apparently, the increasing dropout rate in the master's and doctorate levels is due to the non-compliance of research requirements (BSU Executive Report, 2007).

The shortest answer to the question "What makes a good learner?" is "One who can get started" (Barnes, 1995). The answer to the question "What makes a good researcher?" could be answered in the same way. Unfortunately, students do not seem to get a good start in research that eventually manifests in their academic and standing performance in the graduate school.

It is therefore the aim of this study to assess the graduate school students' attitude towards research. This study shall also look into the indicators that contribute to the students' research attitude.

Nature of Research

Research is a term used in the academe that is usually abused and misused. According to Walliman (2005), research in everyday language describes a multitude of activities including the collection of masses of information, delving into esoteric theories, and production of wonderful new products. The term "research" is often used to pertain to quick reading through a few books or magazines or even asking

some people to be better informed about something. Some people use the term research to mean collecting a vast amount of information and reassembling them into a single report. Very often, the term "research" is used in an emotive fashion in order to impress and build confidence

As research is a part of the many activities of in the graduate school, it is important for the graduate students to understand what research really is. According to the Oxford Encyclopedic Dictionary, research is the systematic investigation into the study of materials, sources, etc. in order to establish facts and reach new conclusions; an endeavour to discover new or collate old facts etc. by the scientific study of a subject or by a course of critical investigation. Sharp, Peters, and Howards (2002) define research as seeking through methodical processes to add to one's own body of knowledge and to that of others, by the discovery of nontrivial facts and insights. Sekaran (1992), as cited by Gray (2004), describe research as systematic and organized effort to investigate a specific problem that needs a solution. Calmorin and Calmorin (2007) say that research is a systematic investigation of phenomena which includes collection, presentation, analysis, and interpretation of facts that links man's speculation with reality.

Garcia, Nuevo, and Sapa (2007) emphasize that the term research contains the pre-fix "re", which means "again" and signifies of the search. Literally, research means to "search again." The etymology thus implies that to research means to seeks new knowledge for the improvement of the quality of life. Leedy (1996) describes research as "the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon with which we are concerned or interested" (Souleyrette, 2000; Walliman, 2005).

The word research has so many meanings attached to it in that "few people have any idea of the real meaning" (Leedy, 1996). The most important characteristics of formal research is that it involves the interpretation of data to draw conclusions. Research is not, then, the mere restating of previously known facts or the process of obtaining new knowledge by searching for information.

According to Leedy (1996), the process of formal research, which this paper is interested in, has eight distinct characteristics, namely: research originates with a question or problem; research requires a clear articulation of a goal; research follows a specific plan of procedure; research usually divides the principal problem into more manageable sub-problems; research is guided by the specific research problem, question, or hypothesis; research accepts certain critical assumptions; research requires the collection and interpretation of data in attempting to resolve the problem that initiated the research; and research builds on previous research.

Features of student-authored researches, on the other hand, include: the research topic may be imposed on the student; the research must be completed within a given time period; funds for experiments, travel, postage and so on may be limited or even non-existent; the results of the research must be presented in a specified manner; and the student may possibly have to relate to an academic supervisor who may lack competence within the field of study chosen or with the process of research itself (Sharp, Peters, & Howard, 2002).

Research as an Academic Requirement

Research as an academic requirement started as early as 1219 A.D. (Calmorin, 1994). Students aiming for a higher degree were obliged to make their own theses and defend it before a council.

Thesis is commonly regarded as a coherent report of research, in which both process and the results are given. Its origin is a problem; its central proposition is a hypothesis. In this sense, thesis often is used as synonymous with dissertation (Latin dissertatus, plural of disserto, frequently of dissero, to discuss); defined as the presentation of a subject, oral or written, usually extended and argumentative; thesis disquisition, hence, in general, extended or didactic remarks or writing (Almack, 1930). Today, thesis is distinguished from dissertation, the former pertaining to the research output of students in the master's level. Doctoral programs usually require original research leading to the defense of a doctoral dissertation ("Graduate Education", n.d.).

The preceding scenario still holds true to date. In the modern-day picture, individuals seeking academic degrees beyond the college level are regarded as "research students" (Phillips and Derek, 2000), apparently because research is a part-and-parcel of the most (if not all) graduate school programs (Koch, n.d.). As such, most graduate school admissions committees, particularly for doctoral programs and for research-oriented master's programs, prefer candidates who have strong backgrounds in methodology and statistics ("Psychology Careers", n.d.).

In the quest of universities to be world renowned, they continue to strive for excellence in all its activities, one of which is the quality of research conducted by its postgraduate students. The reputation and quality of the university's postgraduate programmes are measured in part by the quality of the research activities and theses produced by the students. Since research reports, particularly theses or dissertations, are open to scrutiny, students must strive to develop competencies in research-related activities (Mahmud & Zainol, 2008).

Educational institutions are called as universities in the United States if they offer graduate study emphasizing research as well as teaching. In effect, there are about 1,100 universities in the United States that offer graduate level programs, of which 430 also offer doctoral degrees ("Graduate Education", n.d.).

In the academe, although graduate students usually take some formal course work as part of their degree requirements, research is an important part of most graduate programs. Graduate students do independent research in consultation with a supervising professor (often called the "major professor" or thesis adviser) or a committee of professors who help to set up research plans and schedules. Research-related tasks may be given as a relatively minor part of the course or virtually as the whole basis on which award is made (Sharp, Peters, & Howard, 2002; Denscombe, 2002).

In both ways, the students' outputs are considered determinants of what their universities can do in terms of research. For this reason, research may be regarded by the graduate school student as the decisive link to the higher degree he seeks. In this

instance, research may be regarded as an ultimate good. However, research is the opposite when it becomes the reason for the student to delay his schooling, or worse, dropping out from school altogether. Garcia, Sapa, and Nuevo (2007) confirm that even graduate school students have a phobia for research and thesis writing. Some say it is difficult to write a thesis; they are afraid of the long process related to research undertakings. They view research methodology courses negatively (Lei, 2008). Many graduate students in education and the social sciences have concerns about learning research concepts. In addition, many fail to master key concepts needed to prepare them for designing dissertations and future studies at a doctoral level. Anxiety and doubt can greatly interfere with students" ability to learn and master research concepts (Baltes, Hoffman-Kipp, Lynn, & Weltzer-Ward, 2009). This phobia eventually leads to the students' poor research and academic performance in the graduate school.

Several authors have linked attitude theory to the research training process (Betz, 1986; Royalty & Reising, 1986; Wampold, 1986 as cited by Bieschke, et al., 1993). They hypothesize that inadequate research attitude beliefs are possible actual factors of students' lack of interest and participation in research-related activities. In other words, failure to comply with research requirements in the graduate school is attributed to how much the students know about research and how much they are ready for activities in research.

Research Attitude

Bandura's (1977, 1982, 1986, 1995, 1997) concept of attitude as applied to research can be defined as 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 (Holden et al., 1999; Lei, 2008; Uranu & Beck, 2004, as cited by Baltes, 2009). The author of the article relates that attitude is a good predictor of behavior and research attitude is particularly useful in identifying the forces at work in career choices for graduate students regarding whether or not they will engage in research formally in their work (Mullikin, Bakken, & Betz, 2007).

Baltes, et al. (2009) cited results of previous studies made on the effects of students' research attitude to their performance in the graduate school. Research has shown that low research attitude can interfere with students" research training and practitioners" willingness to conduct research and add scholarly contributions to their field of study (Love, Bahner, Jones, & Nilson, 2007). Research has also shown that high research attitude is an important factor related to students successfully conducting research and pursuing research beyond graduate study (Forester, Kahn, & Hesson-McInnis, 2004).

The study by Lei (2008) on the Factors Changing Attitudes of Graduate School Students toward an Introductory Research Methodology Course reveal that among various research attitude items, students were most confident in using computers, creating graphs, and writing library research papers, and these three items did not differ significantly from the beginning to the end of a semester.

The basic components of research competencies can be traced from the actual research process: problems/objectives; hypotheses; theoretical/conceptual framework;

assumptions; review of related literature; research design; data collection; data processing and statistical treatment; analysis and interpretation; and summary, conclusions and recommendations (Calmorin & Calmorin, 2007).

Factors Affecting Research Attitude

A student's performance in the graduate school is a product of many factors, such as: previous research experience, previous research supervisor, previous research adviser, time, funding, nature of job, writing ability, and motivation to do research, towards obtaining a higher degree, or towards being promoted.

It is important for faculty to stress the value of undergraduate research for graduate school preparation and admission and to provide research opportunities that students can complete before the graduate school application process begins. Research experiences provide important preparation for graduate school (Landrum & Nelson, 2002 as cited by Koch, n.d.).

This is why graduate schools value undergraduate research and use it as a criterion for acceptance into graduate programs (Vittengl et al., 2004 as cited by Baltes, et al., 2009). Some graduate schools assess applicants by way of recommendations coming from previous professors; others do it by way of a test.
Further, Huss et al. (2002) says that students who engage in undergraduate research feel better prepared for graduate school (Baltes, 2009). Attitude in research for graduate students appears to begin with positive experiences in the early research design courses.

It is then important to ensure that the first core research course experience provides the needed support and mastery experiences to enhance research attitude in graduate students (Baltes, 2009). Research courses that bridge prior learning with new applications for and motivation to conduct research may be the road to building research attitude in graduate students.

Involvement in research is important for at least four reasons (Koch, n.d.). First, research can help a student determine his or her area of interest in psychology, thereby allowing for a more focused search of graduate programs. Second, working with a faculty member on research can help yield better letters of recommendation. Third, undergraduate research provides an excellent opportunity to enhance several secondary criteria for graduate school admission. Finally, engaging in research helps develop research-based skills that are important for success in graduate school.

Teachers are a major make-or-break factor for students' success in higher education. Previous professors of students play a part in the students' performance in research in the graduate school. For this very reason, Lamanauskas (2008) convey that teacher qualification question remains urgent. The majority of the researches both national and international in one way or another reveal direct link between students' achievements and teachers' competence.

Meanwhile, the motivation and interest towards research dictate the students' success in the graduate school. The usual negative associations with research courses led to

diminished amounts of time spent in and effort spent on research courses and projects (Lei, 2008 and Papanastasiou, 2005 as cited by Baltes, et al., 2009).

Gray (2004) reminds graduate school students that selecting an issue that is within their capabilities is essential. Skills will, hopefully, develop during the course of the research process; but, by choosing a topic that requires statistical skills when a student is comfortable with only basic mathematics may be a recipe for disaster. In research, projects that are congruent with both work area and experience (the safe approach) may be chosen or beyond both their work and current knowledge set. This poses greater risks, but also enhances opportunities for personal development. Moving the project into unfamiliar work area may also provide opportunities for networking amongst new groups of people which can be advantageous for both the project and the graduate student's own professional future (including their future as a researcher).

Students' interest is somehow likewise linked with the specialization of the professors in the graduate school. It was observed that graduate school applicants often underestimate the importance of identifying potential thesis/dissertation chairs and members that match in their applications. Finding the perfect mentor and future dissertation chair is a key factor to consider ("Highlighting Your Research", n.d.). MacNeill (n.d.) emphasizes that graduate students should make sure there are professors studying their specific areas of interest.

Basic skills related to research are also determinants of students' research performance in the graduate school. Writing and using the computer are two to name a few. Richards and Miller (2005) relate that enrolling in graduate programs entail frequent encounters with writing challenges. Graduate school students meet very rigorous writing demands to complete their programs. In terms of writing the research proposal and the manuscript, students write for audiences who have authority over them (Elbow, 2000 as cited by Richards & Miller, 2005).

Another basic skill is using modern technologies that supposedly aid the undertaking of the research process. Nowadays, data analysis is performed in the computer using various softwares, like the Minitab, Statistical Package for the Social Science (SPSS), and Statistical Analysis Software (SAS). However, Lamanauskas (2008) says that the question of using the newest information communication technologies remains problematic.

Theoretical knowledge in the graduate school students' field is also important. Gray (2004) says that research process requires students to engage at some stage with theoretical perspectives. Sometimes, this will occur before undertaking the research (deductive approach) and at other times after it (inductive approach). As Raimond (2002) reminds, graduate school students should make sure that their topics are capable of being linked to the appropriate academic theory.

Another factor that affects the research attitude of graduate school students is time. According to the National Survey of Student Engagement (2009), as cited by Baltes (2009), students in the graduate schools spend little time on research, especially once they secure a faculty position.

However, it is a totally different story when research tasks are embedded in the job of the graduate school student. As the real world becomes more competitive, complex and uncertain, many people are recognizing the importance and value of research. Hence, research is no longer just the remit of the professional researcher or the university academic. It is increasingly becoming an integral part of the job specification for many occupations (Gray, 2004).

Objectives

The primary objective of this study is to develop a tool that can measure the attitude of graduate students towards research. Particularly, this study aimed to 1) determine the reliability coefficient of the Research Attitude Inventory (RAIn) and 2) Identify the factor structure of research attitude among graduate students.

Methodology

Developmental research method was used to construct the scale intended to measure research attitude. The study was conducted in Benguet Province, the capital of the Cordillera Administrative Region (CAR), Philippines. Benguet was chosen as location of the study for the reason that there is a variety of graduate programs offered in its Higher Education Institutions (HEIs) and cultural and demographic diversity of their enrollees. The fact that enrollees come not only from the different municipalities of Benguet but from nearby provinces as well.

The study involved students enrolled in any of the graduate programs in Education at the time of study. Cluster random sampling technique was employed in selecting the respondents. A total of 160 students participated, where 121 (75.62%) and 38 (23.75%) were enrolled in the Masters and Doctorate levels, respectively.

Data were collected by way of an affective scale. The Research Attitude INventory (RAIn) consisted of 50 statements which was assessed by means of a four-point Likert scale. Items in the RAIn were based on literature review, particularly the various definitions and characteristics of the construct "attitude."

Responses to the items were summarized and coded. Prior to statistical analysis, negatively-keyed items were reverse scored, i.e., "1" for responses of 4, "2" for 3, "3" for 2, and "4" for 1.

Diagnosis of data was done before factor analysis was performed. The coefficient obtained using Kaiser-Meyer-Olkin Measure was 0.812, which is greater than the minimum of 0.50 signifying that the sample is adequate. Bartlett's Test of Sphericity yielded $\chi 2 = 2448.789$, $p < .001$. This figure indicates that correlations between items were sufficiently large for PCA and therefore confirms that the data can be subjected for factor analysis.

Cronbach's coefficient alpha (α) was used to determine the reliability of the scores in the RAIn. Exploratory factor analysis (principal component analysis) was employed to identify the grouping or clustering of the variables. Orthogonal (varimax) with Kaiser normalization was the rotation method specified.

Results and Discussions

This section presents the outcomes of the statistical analyses done on the data gathered. Results are followed by elaborative explanations including implications, attributions, and corroborations with findings of previous related studies conducted.

Reliability of the Research Attitude Inventory (RAIn)

Reliability is defined as the degree to which items in a scale "consistently reflect the construct" being measured. As the RAIn is an affective scale, internal consistency particularly Cronbach's alpha (α) was employed to determine its reliability coefficient. The general rule for an instrument to have acceptable reliability is a coefficient of at least $\alpha = 0.80$ (Field, 2009).

Analysis was done three times before the maximum reliability of the scaled was obtained. Items were deleted in between until the reliability coefficient reached its peak. During the initial run, all 50 items of the item pool was subjected for analysis, which bared a coefficient equivalent to $\alpha = 0.860$. The resulting coefficient is slightly larger than the required quantity, meeting the general requirement of a reliable measure. However, statistics suggest the removal of six items for the obtained coefficient to improve.

With 44 items included for the second run, the reliability coefficient increased by 0.022 such that the resulting measure became $\alpha = 0.882$. Further, the statistics recommended the deletion of five more items so that during the third run, only 41 items were entered. The resulting coefficient was $\alpha = 0.894$. Examination of the statistical output reveal that no other item may be subjected for deletion that will further improve this reliability coefficient. Thus, the maximum reliability coefficient of the RAIn is $\alpha = 0.894$.

Results indicate that the RAIn is a reliable measure. This means that all items included in the instrument consistently measure one and the same construct, which is of graduate students' attitude towards research.

Factor Structure of the RAIn

Items in the final scale (k=41) were included in the factor analysis. A scree plot was plotted to determine the number of factors to be extracted (Figure 1). The point of inflexion of the scree plot occurs at the fifth data point (factor), which denotes that four factors may be extracted.
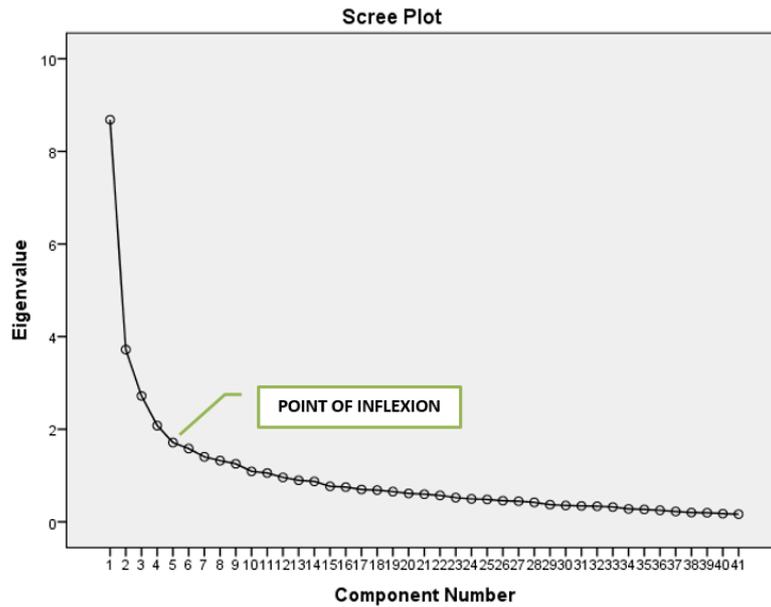
Figure 1: Scree Plot showing the point of inflexion at the fifth data point (factor)

Five components had eigenvalues over Kaiser's criterion of 1 and in combination explained 56.43% of the variance. The convergence of the scree plot and Kaiser's criterion on four components, this is the number of components that were retained in the final analysis.

Factor loadings of the four dimensions of the RAIn after rotation resulted to Component 1 having factor loadings that range from 0.425 to 0.757; the factor loading of Component 2 range from 0.293 to 0.740; factor loadings of Component 3 range from 0.403 to 0.654; and Component 4 has factor loadings from 0.336 to 0.689.

The items that cluster on the same component suggest that Factor 1 represents the graduate students' predisposition (11 items); Factor 2, purpose (10 items); Factor 3, perception (11 items); and Factor 5, preparation (9 items).

Table 1. Factor Loadings of the four components RAIn

Factors	Factor Loadings		Number of Items
	Min	Max	
1 Predisposition	0.425	0.757	11
2 Purpose	0.293	0.740	10
3 Perception	0.403	0.654	11
4 Preparation	0.336	0.689	9
Total			41

Predisposition describes a graduate students' personal viewpoint about research. Items included in this component are graduate students' traits that are essential for research (e.g., inquisitive), belief about research, judgment on research activities, and emotional state when thinking about or doing research (e.g., enthusiasm).

Purpose defines a graduate student's mindset on learning research and on the value of research in the curriculum. Items in this factor structure of research attitude include perception about the importance of research activities, significance of the inclusion of research as requirement in the graduate program, and application of research in one's field of specialization.

Perception depicts a graduate student's negative position about research. In this component, items include thoughts about research as a difficult field, cost of research, and exclusivity of research.

Preparation portrays a graduate student's willingness to involve himself/herself to research-related activities. Items in this component describe students' motivation, initiative, and readiness to participate in and conduct research activities.

Conclusion

Research attitude may be measured through four lenses (factors), namely predisposition towards research, appreciation of the purpose of research, perception especially in terms of position towards the pessimistic view of research, and preparedness to participate in research. Findings of this study imply that undergraduate research course is essential in developing a positive attitude of students towards research in the graduate level. As such, it is recommended that 1) reliability of RAIn might be tested in other Higher Education Institutions and other graduate programs as well; 2) RAIn may be administered to graduate students from different areas of the Philippines to establish its norms; 3) device ways to improve the perception of graduate students about research (e.g., motivation, teaching strategies, requirements); and 4) integrate research in the undergraduate level and/or Include research as required course in the undergraduate programs in Education.

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