



THE RELATIONSHIP BETWEEN RESEARCH SELF-EFFICACY, RESEARCH ANXIETY AND ATTITUDE TOWARD RESEARCH: A STUDY OF AGRICULTURAL GRADUATE STUDENTS

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Abstract

The main purpose of this study was to investigate the relationship between agricultural students' research self-efficacy and their personal and professional characteristics, research anxiety and attitude toward research. The statistical population of this study was graduate agricultural students (M.Sc. and Ph.D.) at Shiraz University, Iran. A sample of 210 students was selected using a proportional stratified sampling technique. A questionnaire was developed to interview the subjects of the study of which the validity and reliability were estimated based on opinions of a panel of experts and Cronbach's alpha coefficient, respectively. Results revealed that the respondents had a moderate level of research anxiety, high level of research self-efficacy and positive attitude toward research. The t-test revealed that there was a significant difference between research self-efficacy levels of M.Sc. students with those of Ph.D. students, and Ph.D. students had higher levels of research self-efficacy than did M.Sc. students. Further, results indicated that there was a positive significant relationship between age, number of published papers, attitude toward research and students' research self-efficacy. In addition, the relationship between research anxiety and research self-efficacy was negative. Suggestions have been provided based on the findings.

Key Words: Agricultural graduate student; Attitude toward research; Research anxiety; Research self-efficacy.

INTRODUCTION

The first academic revolution, taking off in the late 19th century, made research a university function in addition to the traditional task of teaching (Etzkowitz, 2003). At present, higher education is usually broken down into three components, namely teaching, research and service. Research is the systematic process of collecting and analyzing information to increase a human understanding of the phenomenon under study. In other words, research is a process comprised of data collection, analysis, interpretation, and assessment procedures conducted in a planned manner in order to find solutions to a problem. Faculty members and graduate students are two main groups who conduct research in universities. Because of the education process in universities and need to submit thesis or dissertation for fulfillment of a degree, graduate students play an important role in research process.

During recent decades, the construct self-efficacy has been receiving growing attention in educational research. In summary, research self-efficacy refers to one's capabilities to execute particular tasks in research domain. Research self-efficacy has been found to predict students' interest in conducting research (Bishop and Bieschke, 1998; Kahn and Scott, 1997) and is related to research productivity among students (Kahn, 2001; Bard et al. 2000). The accurate assessment of research self-efficacy may help faculty identify a given student's self-identified strengths and weaknesses with respect to research, thereby facilitating graduate research



training and guidance (Forester et al. 2004). Research has shown that low research self-efficacy can interfere with students' research training and their willingness to conduct research (Love et al. 2007). Research has also shown that high research self-efficacy is an important factor related to students successfully conducting research and pursuing research beyond graduate study (Forester et al. 2004).

However, little is known about research self-efficacy and its correlates among agricultural students. This knowledge enables us to better understand and minimize elements that could impede or interfere with the research process. Therefore, the goal of this research was to investigate the relationship between agricultural students' research self-efficacy and their personal and professional characteristics, research anxiety and attitude toward research. Specific objectives of the study were to:

1. Describe agricultural students' research self-efficacy, research anxiety and their attitudes toward research;
2. Evaluate differences in research self-efficacy of students;
3. Examine the relationships between agricultural students' personal and professional characteristics, research anxiety and attitude toward research with their research self-efficacy.

Research self-efficacy

A growing literature has documented the importance of research self-efficacy in the research training of students (Gelso and Lent, 2000). In general, self-efficacy term represents one's confidence in being able to perform a given behavior. It is just not possible to elucidate aspects of human functioning such as motivation, learning, self-regulation and achievement without bringing the role played by self-efficacy beliefs into the discussion (Pajares and Urdan, 2006). Self-efficacy helps individuals to decide how much effort they will spend on a task, how long they will persist when experiencing difficulties, and how resilient they will appear in detrimental situations (Dinther et al. 2010). According to self-efficacy theory, if people believe that they have the ability to complete successfully a given behavior, then they are more likely to engage in that behavior (Phillips and Russell, 1994).

The term self-efficacy was soon extended to research domain. Forester et al. (2004) defined research self-efficacy as one's confidence in successfully performing tasks associated with conducting research (e.g., performing a literature review or analyzing data). Bieschke (2006) stated that research self-efficacy is judgments about one's ability to perform specific research. Lei (2008) and Uranu and Beck (2005) believed that research self-efficacy 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. Mullikin et al. (2007) defined research self-efficacy as the confidence one has in his or her abilities to perform research-related tasks and activities. Researchers identified four dimensions for research self-efficacy, including: data analysis (i.e., confidence in one's ability to work with and analyze data), research integration (i.e., confidence in one's ability to integrate one's research ideas with the existing literature), data collection (i.e., confidence in one's ability to complete data collections tasks such as training raters and keeping accurate records), and technical writing (i.e., one's ability to write research articles for publication) (Forester et al. 2004).

High research self-efficacy has been connected to both future research involvement and higher research productivity (Lei, 2008; Bieschke, 2006; Hollingsworth and Fassinger, 2002; Khan, 2001; Bard et al. 2000; Bieschke et al. 1996). Many studies have been conducted on the issue of research self-efficacy. Some of them are reviewed here. Schlosser and Gelso (2001) found that length of advisee–adviser relationships was significantly correlated with advisees' research self-efficacy beliefs. Unrau and Beck (2005) stated that students' research self-efficacy increased over the course of a semester. In relation to gender, results have been inconsistent. A few studies have not typically found that gender influenced research self-efficacy beliefs (Williams, 2004; Bishop and Bieschke, 1998; Bieschke et al. 1996; Gelso et al. 1996) although three studies found that males have higher research self-efficacy than females (Bakken et al. 2003; Kahn and Scott, 1997; Griffin, no date). Results of some researches showed that there is a direct link between research self-efficacy beliefs and students' interest in research (Bard et al. 2000; Bishop and Bieschke, 1998; Kahn and Scott, 1997; Bieschke et al. 1996). One study found that amount of research experience was significantly related to research self-efficacy beliefs (Bieschke et al. 1996) and another study revealed that there is a significant difference based on college grade level on research self-efficacy (Williams 2004). Hollingsworth and Fassinger (2002) and Kahn (2001) reported that perception of the academic research training environment is a robust predictor of



research self-efficacy among students. Bishop and Bieschke (1998) identified year in graduate program as a significant predictor of research self-efficacy beliefs. Finally, Baltes et al. (2010) believed that anxiety and doubt can greatly interfere with students' ability to learn and master research concepts.

Research anxiety

Research anxiety refers to the characteristics which a student perceives as discomforting, to the extent that productivity may be reduced (Higgins and Kotrlik, 2006). In the academic domain, research has demonstrated strong relationships among various dimensions of self-efficacy and anxiety (Shelton and Mallinckrodt, 1991; Griffin, no date). McGrath (2002) noted that fear and anxiety are often the causes of students failing to complete their dissertations and some students face considerable anxiety toward the dissertation process. Indeed, others who have experienced the dissertation process have acknowledged the apparent link between anxiety and procrastination toward the dissertation as well (Carbonell, 2000). Students with more confidence in their abilities to perform the dissertation task are less likely to react in a detrimental way to stress related to the dissertation process, have less trepidation for the dissertation, and are therefore more likely to demonstrate greater perseverance on the dissertation (Griffin, no date).

Attitude toward research

Research showed that students typically tend to view research-related courses with negative attitudes and feelings (Munir et al. 2009; Papanastasiou, 2005). One of the main problems of these negative attitudes is that they have been found to serve as obstacles to learning (Papanastasiou, 2005). Students' attitude influences how they mentally approach research including all the work related to that research. A positive attitude enables students to solve the problem quickly where as, a negative attitude hampers the efforts in research. The enhancement of positive attitudes toward research, therefore, is one of the key components that impacts students' research self-efficacy. For this reason, investigating their attitude toward research is a great stride for future educational development.

METHODOLOGY

Research population of the present survey included M.Sc. and Ph.D. students from the Faculty of Agriculture at Shiraz University (N=604). Participants were selected using a proportional stratified sampling technique. Level of education was the criterion for sample stratification. Therefore, sample size for M.Sc. and Ph.D. students was 160 and 50 respectively (n=210). A questionnaire was used to collect data for this study. The questionnaire included four major components: (1) personal and professional information, (2) research self-efficacy scale, (3) research anxiety scale and (4) attitude toward research scale. Personal and professional information included gender, age, education, Grade Point Average (G.P.A.), major, number of published papers, number of conducted research projects, number of credits and research method courses passed. A scale for measuring research self-efficacy was developed using modified version scale from previous study (Unrau and Grinnell, 2005). This scale consisted of 13 items measured on a five-point Likert type scale (from 1= very low to 5= very high). The scales for measuring research anxiety and attitude toward research were developed using modified version scales from Higgins and Kotrlik (2006) and Walker (2010), respectively. The first scale consisted of 15 items and the second scale included 12 items. Each item was scored on a five-point Likert scale (from 1= strongly disagree to 5= strongly agree). The content validity of the survey instrument was assessed by the experts of the agricultural education regarding the relevance of the items and the unambiguity of their formulation. Cronbach's alpha was calculated for the scales to ensure internal consistency among the items. The reliability of the scales were 0.93, 0.85 and 0.86 for research self-efficacy, research anxiety and attitude toward research, respectively, which is considered to be an acceptable index for field research (Pallant, 2007). Data were described using frequencies, percentages, means, and standard deviations. The independent samples t-test was used to test for differences if any among students' research self-efficacy based on their gender and education. The Pearson product-moment correlation was employed to find relationships between the variables of the research including research self-efficacy, research anxiety, attitude toward research, and personal and professional characteristics.

RESULTS

Demographics of the participants

From the total participants, 71.3% were males and 28.7% were females. The average age was 27 years, with a range of 22 to 48. As for educational level, 76.6% were M.Sc. and 23.4% were Ph.D. students. The G.P.A. of students was 17 and ranged from 14 to 19.95. Of the respondents, 32.7% reported that they completed at least one course on research methods, while 67.3% did not. Regarding their majors, 16.3% of the subjects were majoring in crop production and breeding, 14.4% were studying in irrigation, 10.5% were students of agricultural entomology, and the rest studied soil sciences, agricultural extension and education, horticulture, agricultural machinery, agricultural economics, animal sciences, or food sciences and technology. The average number of papers published by students was 4, the average number of research projects conducted was 1, and the average number of credits passed was 20.

Research self-efficacy of the students

Table 1 summarizes descriptive statistics for the items of research self-efficacy scale used in the analysis, including mean, standard deviation and rank of the items from students' point of views. The findings revealed that students had a high level of research self-efficacy. When analyzing the items of research self-efficacy in the questionnaire, it was found out that "the ability to do effective electronic database searching of the scholarly literature" (Mean=4.09, SD=0.91), "the ability to design and implement the best measurement approach for the study" (Mean=3.87, SD= 0.95) and "the ability to review a particular area of agricultural science theory and research, and write a balanced and comprehensive literature review" (Mean=3.77, SD=0.90) were rated somewhat higher than the other items.

Table 1: Responses to the research self-efficacy scale (n=210)

item	Mean	S.D.	Rank
The ability to do effective electronic database searching of the scholarly literature	4.09	0.91	1
The ability to design and implement the best measurement approach for the study	3.87	0.95	2
The ability to review a particular area of agricultural science theory and research, and write a balanced and comprehensive literature review	3.77	0.90	3
The ability to effectively present findings both verbally and in written form	3.76	0.92	4
The ability to design and implement the best sampling strategy for the study	3.76	0.98	5
The ability to read and understand research findings and discussions in academic journals	3.75	0.86	6
The ability to choose a research design that will answer a set of research questions and/or will test a set of hypotheses	3.72	0.87	7
The ability to identify implications for future research	3.69	0.98	8
The ability to interpret and understand statistical printouts	3.67	0.98	9
The ability to design and implement the best data analysis strategy for the study	3.66	1.03	10
The ability to formulate a clear research question or testable hypothesis	3.65	0.95	11
The ability to identify and report limitations of the study	3.65	1.03	12
The ability to use various technological advances effectively in carrying out research	3.62	1	13

Scale: Very low=1; Low=2; Average=3; High=4; Very high=5.

Research anxiety of the students

Table 2 shows the responses to 15 items contained in the research anxiety scale. In general, the research anxiety of the graduate students at Shiraz University was moderate. The highest mean score belonged to "I need to improve my research skills" (Mean=4.25, SD=0.89), "I need to improve my statistical skills" (Mean=4.16, SD=0.95), and "It bothers me that my research may not be judged as a quality work" (Mean=3.50,

SD=1.12), respectively. Item 15, "I am confident when writing the conclusions of a study for possible publication in a referred research journal", had the lowest mean score at 2.09 (SD=0.86), indicating a lack in confidence when writing the conclusions for a research study.

Table 2. Responses to the research anxiety scale (n=210)

Item	Mean	S.D.	Rank
I need to improve my research skills	4.25	0.89	1
I need to improve my statistical skills	4.16	0.95	2
It bothers me that my research may not be judged as a quality work	3.50	1.12	3
When I conduct research, I worry about the possibility of the manuscript not being accepted for publication	3.47	1.08	4
When reading research articles, I am apprehensive about being able to synthesize the findings	3.38	1.05	5
* I produce research that is respected by my peers	2.35	0.87	6
When I conduct research, I worry about the possibility of using incorrect data analysis	3.33	1.16	7
It bothers me that my research may not be judged as acceptable by reviewers for research journals	3.31	1.13	8
When I conduct research, I fear that it is poor compared to others in my field	3.26	1.18	9
I often feel uncomfortable when discussing research methods	3.22	1.16	10
When working on a research project, I experience anxiety	3.00	1.19	11
* I am confident when preparing a research methodology of a study for possible publication in a referred research journal	2.33	0.92	12
* I am confident when conducting the data analysis of a study for possible publication in a referred research journal	2.29	0.99	13
* I am confident when writing the theoretical framework for a research study	2.14	0.91	14
* I am confident when writing the conclusions of a study for possible publication in a referred research journal	2.09	0.86	15

Items have been reverse scored.

Scale: Strongly disagree=1; Disagree=2; Undecided=3; Agree=4; Strongly agree=5.

Students' attitudes toward research

Students were asked to express their attitudes toward research with regards to 12 items. Means and standard deviations for 12 attitude items are reported in Table 3. Overall, Shiraz University students tend to hold positive attitudes toward research. The highest mean was declared for the item of "research is important for me" (Mean=4.46; SD= 0.73). Another three items that had higher mean scores than others were "research should be taught to all students" (Mean=4.28, SD=0.83), "many important discoveries are the result of the research" (Mean=4.21, SD=0.89) and "research is very valuable" (Mean=4.20, SD=0.86). It means that graduate students tend to view research with positive feelings.

Table 3: Responses to the attitude toward research scale (n=210)

Item	Mean	S.D.	Rank
Research is important for me	4.46	0.73	1
Research should be taught to all students	4.28	0.83	2
Many important discoveries are the result of the research	4.21	0.89	3
Research is very valuable	4.20	0.86	4
Research is an important step toward discovering the universe	4.17	0.87	5
Research is interesting	3.99	1	6
I enjoy research	3.94	1	7
The skills I have acquired in research will be helpful to me in the future	3.83	1	8
* Doing research is a waste of time	3.77	1.24	9
Research can help expand knowledge	3.69	1.09	10
I use research in my daily life	3.55	0.95	11

* Research is tedious task	3.15	1.26	12
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Items have been reverse scored.

Scale: Strongly disagree=1; Disagree=2; Undecided=3; Agree=4; Strongly agree=5.

Agricultural students' research self-efficacy, research anxiety and attitude toward research

The responses to 13 items of research self-efficacy, 15 items of research anxiety and 12 items of attitude toward research, based on the five point Likert type scale, ranged from 13 to 65, 15 to 75 and 12 to 60, respectively. The students were divided into three groups, based on their percentile ranks on research self-efficacy scale. The top group, participants with a percentile rank of 0.66+ on the scale, consisted of 32.4% of the subjects whose research self-efficacy was high. The middle group, with percentile rank between 0.33 and 0.66, included 33.8% of the participants with a moderate level of research self-efficacy, and the low group, those with a percentile rank 0.33-, included the low-research-self-efficacy 33.8% subjects. The same approach (i.e., grouping by percentile rank) was applied to the research anxiety scale; the top group included 28.6% of the subjects whose research anxiety was high. The middle group, consisted of 34.3% of the participants with a moderate level of research anxiety, and the low group included the low-research-anxiety 37.1% subjects. By the same token, the strong-attitude group consisted of 31 % subjects; the moderate-attitude group included 35.7% and the weak-attitude group comprised 33.3% (Table 4).

Table 4: Frequency and percentage of research self-efficacy, research anxiety and attitude toward research (n=210)

Variable	level	F	%
Research self-efficacy	Low	71	33.8
	Moderate	71	33.8
	high	68	32.4
Research anxiety	Low	78	37.1
	Moderate	72	34.3
	high	60	28.6
Attitude toward research	Weak	70	33.3
	Moderate	75	35.7
	Strong	65	31.0

Differences between research self-efficacy of students

A set of independent-samples t-tests were conducted to compare the research self-efficacy scores of males and females, and those of M.Sc. and Ph.D. students (table 5). As for gender, there was no significant difference between the scores of males and females. In relation to education, there was a significant difference between the scores of M.Sc. (Mean=47.22, SD=9.45) and Ph.D. students [Mean=51.39, SD=8.95; t (207) =-2.731, p=0.0071], in which Ph.D. students had higher scores than M.Sc. students. The magnitude of the differences in the means was small ($\eta^2=0.03$).

Table 5. Differences between respondents in research self-efficacy

Variable	t	df	p-value	η^2
Gender	1.08	207	0.2811	-
Education	-2.731	207	0.0071**	0.03

** : Statistically significant at 1% significance level.

Relationships between research variables and students' research self-efficacy

A Pearson product-moment correlation matrix was created to determine if there is any relationship between students' research self-efficacy and their personal (age, G.P.A.) and professional (papers, research projects and credits) characteristics, research anxiety and attitude toward research. Table 6 displays the results of this analysis. It was found out that students' age and their scores on research self-efficacy ($r=0.178$, $n=199$,

sig=0.012) were positively significantly correlated. In much the same way, there was a positive significant relationship between students' research self-efficacy and number of papers published ($r=0.185$, $n=210$, sig=0.007) by them as well as their attitude toward research ($r=0.233$, $n=210$, sig=0.001). On the other hand, students' research self-efficacy was negatively significantly related to their research anxiety ($r=-0.232$, $n=210$, sig=.001). No relationships existed between research self-efficacy and G.P.A., the number of published papers, the number of conducted researches and the number of credits passed.

Table 6 Relationship between selected variables with students' research self-efficacy

Random variable-1	Random variable-2	Correlation coefficient
Age	Research self-efficacy	0.178*
G.P.A.	Research self-efficacy	0.084
Number of published papers	Research self-efficacy	0.185**
Number of conducted research	Research self-efficacy	0.087
Number of credits passed	Research self-efficacy	-0.132
Research anxiety	Research self-efficacy	-0.232**
Attitude toward research	Research self-efficacy	0.233**

*: Statistically significant at 5% significance level.

**: Statistically significant at 1% significance level.

DISCUSSION

Discussion on the findings and implications

The overall aim of this study was to investigate the relationship between agricultural students' research self-efficacy with their personal and professional characteristics, research anxiety and attitude toward research. This study found that there was a positive and statistically significant correlation between research self-efficacy and students' age. It means that as one ages, research self-efficacy increases. In other words, older students are more confident in their ability to conduct research than younger students. Findings suggested that there was a positive and statistically significant relationship between research self-efficacy and number of papers published by students. That is, students with higher scores of research self-efficacy may be more efficacious in terms of publishing papers, than those with lower scores. This finding is consistent with previous research (Bieschke et al. 1996; Vaccaro, 2009). Therefore, based on these findings it is recommended that research training begin early in the graduate program, exposing students to different research methodologies that provide students not only with technical skills but also interest in research by engaging the students in the research and scholarly activity processes. The present research also found that students' research self-efficacy was negatively correlated with their research anxiety. It means that students who are more confident in their ability to perform during the thesis or dissertation experience are less anxious than less confident students. The finding is in line with the results of other research (Baltes et al. 2010; McGrath, 2002; Shelton and Mallinckrodt, 1991; and, Griffin, No date). It was also found that there was a positive and significant relationship between students' attitudes toward research with their research self-efficacy. This indicates that students with more positive attitudes toward research are more confident in their ability to conduct research. Finally, Ph.D. students reported higher level of research self-efficacy than M.Sc. students. This may be related to more experiences of Ph.D. students in research-related tasks than M.Sc. students. Griffin, No date). It was also found that there was a positive and significant relationship between students' attitudes toward research with their research self-efficacy. This indicates that students with more positive attitudes toward research are more confident in their ability to conduct research. Finally, Ph.D. students reported higher level of research self-efficacy than M.Sc. students. This may be related to more experiences of Ph.D. students in research-related tasks than M.Sc. students.



Research limitations and recommendations for future studies

Although this research provides insights into the agricultural students' research self-efficacy at Shiraz University, the results must be carefully interpreted. First, although the sample size was adequate for the study, members from only one Iranian university were selected, thus, external validity limitations exist, and it may introduce a selection bias to the findings. Additional investigations with other universities could generate findings that are more robust and generalizable. Second, although self-reported measures (the measures in which respondents are asked to report directly on their own behaviors, beliefs, attitudes, etc.) represent the most appropriate method in this study because all the variables referred to the subjective states, as with any self-reported behavior, this runs the risk of a response bias. Therefore, similar studies that use multi-method and multi-trait measurements should produce more powerful results. For example, the use of qualitative data (e.g., responses to open-ended questions and participant comments, focus groups and interviews) would permit the researcher to gain the rich description and level of depth not provided in quantitative analysis. Third, because of the time limit, this research was conducted only on M.Sc. and Ph.D. students. Therefore, to generalize the results for B.Sc. students, the study should have involved more participants at different level of education. Future studies could also consider faculty mentoring, interest in research and scholarly activities as potential effective variables on students' research self-efficacy. With regard to scholarly activities, we just investigated number of papers published in journals by the students. However, other scholarly activities include grant writing, speeches, books, and presentations.

CONCLUSIONS

Many graduate students have concerns about learning research concepts. The relationships between agricultural students' research self-efficacy and their personal and professional characteristics, research anxiety and attitude toward research were investigated in this study. The study revealed that there was a positive significant relationship between students' research self-efficacy and some of their personal and professional characteristics, including age and numbers of published papers. The results also indicated that there was a positive significant relationship between students' research self-efficacy and their attitude toward research. Furthermore, the study revealed that there was a negative relationship between students' research self-efficacy and their research anxiety. By eliciting feedback from graduate students about which aspects of the research process create various levels of anxiety, a picture may emerge which helps explain why so many students fail to complete the thesis or dissertation. Furthermore, understanding where research anxiety originates and how it is being propagated could provide pertinent information for administrators to better prepare and support graduate students in the area of research. The results of this research could help universities that prepare graduate students to better understand their attitudes toward research and will enable them to increase the research self-efficacy of students by improving the quality of their research preparation.

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