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Doctoral Student Research as a Creative Endeavour

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Abstract

Doctoral student research is explored as a creative activity. Hypotheses concerning several factors associated with research activity are developed and tested using a sample of management doctoral students. Findings suggest that research-related goals provided by the dissertation chair and student information seeking efforts are both positively related to research activity and that information seeking partially mediates the effect of chair goals on research activity. In addition, the attainment of research products is influenced by the student's intrinsic motivation for research as well as his or her information seeking efforts. Further, research activity mediates the effect of information seeking on research products. The implications of these findings for doctoral students and faculty members are considered.

Introduction

What determines the success of a doctoral student with regards to his or her research efforts? To answer this question we must recognize that completing a doctoral program is a challenging endeavour for the student and also presents a challenge to departments in terms of how best to develop students. This is an important question given the typically small number of students in a program, the significant resources the department and university must commit to each student, and the need for departments to develop and offer quality students to the marketplace. In fact, as the demand for new business-related Ph.D.s continues to outpace supply (Merritt, 2004); it is becoming more imperative to examine the issues involved in producing quality Ph.D.s in the business school. Towards that end, this paper will explore research efforts among a sample of Management doctoral students.

The operating assumption for most doctoral programs is that they are research-oriented (LaPidus, 1997). That is, they are designed to help junior scholars develop the ability to conduct sound, rigorous research (Golde & Dore, 2001) based on a system that involves coursework coupled with research under the guidance of an established researcher (LaPidus, 1997). Interestingly, little recent research in the organizational sciences has examined scholars in general. In fact, Newman and Cooper (1993) found that only 4 of the over 1800 articles published in the *Journal of Applied Psychology*, *Academy of Management Journal*, and *Personnel Psychology* during

the period of 1980-1989 addressed issues related to scholarly productivity and rewards. Nonetheless, at least one study has examined the functioning of doctoral students. Bauer and Green (1994) examined a sample of doctoral students across an array of sciences and found that individuals who had a realistic understanding of program expectations and who had past research experience and were more involved in their doctoral programs, were more engaged in doctoral research, and were more productive as measured by objective outcomes.

Researchers have, however, begun to consider management scholars post graduation. For example, Gomez-Mejia and Balkin (1992) studied factors related to faculty pay among a sample of management professors and found that the main predictor of compensation is the number of publications appearing in top-tier journals an individual has authored. Cable and Murray (1999) examined the hiring practices by management departments in schools of business and found that hiring decisions were better characterized by tournaments in which job candidates were selected based on publication and presentation success instead of the eminence of their doctoral committee chairpersons or the prestige of their Ph.D. Researchers have also considered the determinants of scholarly productivity. For example, Long, Bowers, Barnett, and White (1998) examined a class of management Ph.D. graduates and found that academic affiliation, but not academic origin, was the primary determinant of scholarly productivity. Further, Taylor, Locke, Lee, and Gist (1984) explored the relationship between Type A behaviour and faculty productivity and found that Type A behaviour (e.g., aggressively working to achieve more in less time) was directly related to research productivity.

Thus, while we know that publications heavily influence job attainment, to date researchers largely have not taken a step back in the process to consider what factors influence valued student outcomes while they are still in the doctoral program. Thus, this paper adds to the body of research examining scholars, doctoral students in particular, by presenting the results of an exploratory study designed to examine factors associated with management doctoral student research activity. Specifically, we frame the discussion in terms of creativity, arguing that research activity is inherently a creative process.

Research as a Creative Endeavour

We suggest that the discussion of student scholarly work presents two main considerations: research activity and research products. Research activity encompasses the work and effort a student has put forth on research tasks including writing research papers, collecting data, and analyzing data. Research products represent the much more rare, or sometimes nonexistent, outcomes of these efforts. These may include refereed journal articles, book chapters, conference presentations, and so on. This perspective on

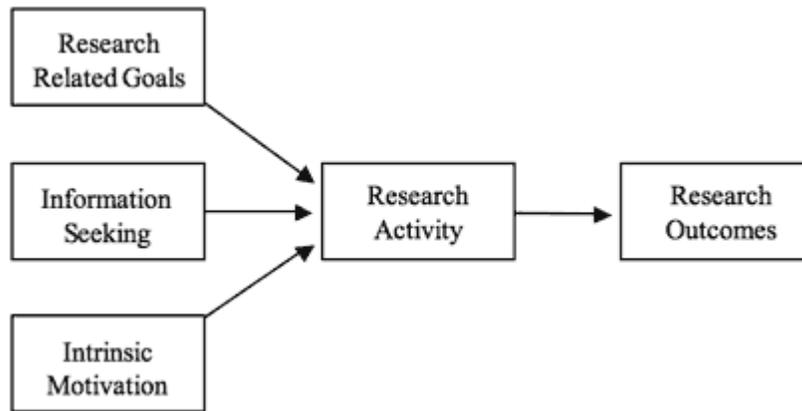
research is guided by studies of employee creativity and our contention that scholarly research is an inherently creative endeavour. In fact, it has long been noted that creativity is an important measure by which organizational scholarship can be judged (Daft, 1984). Creativity is most often defined as the production of novel and useful ideas or products (e.g., Amabile, 1988; Oldham & Cummings, 1996). Thus our approach suggests that research products are the ultimate creative outcomes for students – and that they are predicated on creative efforts (i.e., research activity).

In fact, in a different context, Bauer and Green (1994) empirically demonstrated this basic relationship, finding a positive association between research activity and research products. Theoretically, this finding builds on the work of Drazin, Glynn, and Kazanjian (1999) who defined creativity as the process of engagement in creative acts. Their work suggests that a strict focus on eventual creative outcomes overlooks the importance of creative efforts throughout the process. Similar ideas were expressed in the work of Albrecht & Hall (1991), Kahn (1990), Newell, Shaw, and Simon (1962), and Politz (1975). Thus, given the foundational importance of research activity for the attainment of research outcomes, the focus of the current paper will primarily be to explore factors that influence research activity.

Influences on Research Activity

Although doctoral education is generally geared towards research, evidence suggests that students are not always well informed about certain aspects of the research process. In fact, one broad based study of doctoral students suggests that fewer than half of all students feel prepared by their program to publish and only just over half of all students feel confident in their ability to do so (Golde & Dore, 2001). Given the paucity of research in this area, it is unclear which variables might influence research activity among the large array of variables that could be considered. Drawing primarily on the creativity literature, three variables that are particularly salient in the context of creative work will be considered: goals set by one's dissertation chair, intrinsic motivation for research, and information seeking. Figure 1 below displays the proposed relationships among the variables.

Figure 1
A Model Of Management Doctoral Student Activity And Outcomes



Dissertation Chair Goals

Research has established the importance of a student's dissertation chair (e.g., Cable & Murray, 1999; Crane, 1965) as well as the utility of goals in the context of creativity (Shalley, 1991, 1995) and faculty productivity (Taylor et al, 1984). Thus, goals set by one's dissertation chair will likely be related to student research activity.

The importance of a student's dissertation committee chairperson in predicting reward distributions such as job attainments and outcomes such as research productivity has been demonstrated in the literature (Cable & Murray, 1999; Crane, 1965; Reskin, 1979). However, the importance of the chair's role for student research activity has not been considered from the perspective of goal setting. Building on volumes of research suggesting that goals can increase individual productivity, Shalley (1991, 1995) found that the presence of a creativity goal has a positive effect on creative behaviour. She suggests that this might be a result of enhanced effort and the ability of goals to direct attention to relevant information, given that effort and informational resources are key ingredients for creativity. Thus, building on research supporting the efficacy of specific and challenging goals (Locke & Latham, 1990), we expect that goals set by one's chair pertaining to research productivity will be influential in guiding the student's efforts. In particular, we suspect that when a chair sets specific and challenging research-related goals for a student – to obtain high quality publications, conference presentations, and employment at a research institution – this action will be related to the student's behaviour. Given the important role of the chair in the student's professional development, the ability of goals to direct attention and effort, and the creative nature of conducting research, we propose:

Hypothesis 1: Research-related goals (concerning publications, conference presentations, and employment at a research-oriented institution) set by the student's chair will be positively related to research activity.

Intrinsic Motivation

Intrinsically motivated behaviours are ones for which there is no apparent reward except the activity itself (Deci, 1975), thus it refers to an inherent enjoyment of one's tasks or work. Considerable research suggests that intrinsically motivated behaviours result in creativity, flexibility, and spontaneity (e.g., Amabile, 1983; Deci & Ryan, 1985). Empirically, the general finding that intrinsic motivation facilitates creativity has been repeatedly demonstrated (see Amabile, 1996 or Ryan & Deci, 2000 for a review).

It has been suggested that strong motivation is related to productivity in science (e.g., Fox, 1983). Thus, it is likely that intrinsic motivation for conducting research will play an important role in a student's ability to create a body of research activity. This stems from the fact that intrinsic motivation is thought to encourage exploration, the search for many alternatives (Zhou, 1998), and persistence (Oldham & Cummings, 1996; Zhou, 1998) - which is a key requirement for attaining publications (Schneider, 1985). In the context of conducting research these should be particularly useful behaviours. The research process is a complex and often long-term endeavour that can be fraught with both theoretical questions as well as methodological ambiguities. In particular, regarding the dissertation process for doctoral students, sustained personal interest in the topic is a key influence on successful dissertation completion (Gordon, 2003). Given that many doctoral students perceive the research process as uncertain and painful (Graham & Stablein, 1985), intrinsic motivation seems essential. In short, research is a challenging process that should be facilitated by deep intrinsic interest leading to persistence in effort. Thus we hypothesize:

Hypothesis 2: Intrinsic motivation for research activities will be positively related to research activity.

Information Seeking

The socialization literature describes newcomer information seeking as a way for individuals to compensate for the lack of perfect role-related information provided by an organization (Miller & Jablin, 1991). Information seeking is important because it reduces uncertainty, thus allowing the employee to more successfully understand, predict, and control the environment (Morrison, 1993). Of course, it stands to reason that this behaviour may continue to be instrumental for employees even after they become more integrated into the organization. For example, it is often the case that an employee's job duties will change or that the work is particularly complex. In the current context, we suggest that student research activities represent a case in which both of these are true – tasks are often changing and the work is complex.

Amabile (1983, 1996) suggests that creativity is partially determined by domain skills – an individual's available mental data for solving a problem or completing a task that is comprised of all domain knowledge including facts, principles, technical skills, and opinions.

Thus we suggest that domain knowledge can be strengthened through information seeking, a contention that has not yet been explored in the literature. Morrison (1993) suggests that employees may seek five types of information: technical, referent, normative, performance, and social. However, given the focus on the research efforts of doctoral students, four aspects appear most salient. First, students are likely to seek normative information about expected behaviours and attitudes relative to research. Next, as they become involved in research projects, a student may seek technical information as he or she attempts to build research skills. In addition, performance feedback information is likely to be sought to enable the student to gauge how well research efforts are being perceived in general. Finally, more specific research product-related feedback is likely to be sought as students desire to have their research papers reviewed and critiqued by faculty members. In short, it is likely that the receipt of these types of information will support domain skills and facilitate the student's ability to generate a body of research activity. Thus, we propose:

Hypothesis 3: Information seeking will be positively related to research activity.

The Mediating Role of Research Activity

Earlier, the fundamental positive relationship between research activity and research products was discussed based on the idea that finished products are the direct result of a body of work in progress over time (e.g., Albrecht & Hall, 1991; Bauer & Green, 1994; Drazin et al., 1999). Subsequently, we described the way in which three factors may influence a student's research activity. Thus, as shown in Figure 1, given that creative outcomes are predicated on significant creative efforts, it is theoretically plausible that research activity is the mechanism through which the antecedents discussed above, influence research products. Thus, we offer a final hypothesis:

Hypothesis 4: Research activity will mediate the relationship between the indicators noted above (chair goals, intrinsic motivation, and information seeking) and research products.

Methods

Respondents and Procedures

A sample of later stage management doctoral students was identified in October and November 2001 through the Academy of Management's placement website as well as several list serve electronic mailing addresses (e.g., Academy of Management Student List Serve). An electronic mail message was sent to these individuals informing them of the nature of our research and asking them to participate. Specifically, we invited only those individuals who were currently ABD (all but dissertation) status. This ensured that the respondents were advanced enough in their programs such that all of

our measures would be relevant to them. A hyperlink was included in the message allowing those choosing to participate to connect to a survey on the World Wide Web. Use of web-based surveys has become widespread as Internet use has grown because of cost and speed advantages (Simsek & Veiga, 2001). Further, data collected via web-based surveys rivals traditional mail survey data in several ways including the incidence of nonresponse errors and item variability (Stanton, 1998).

The population of ABD candidates in Management during 2001 when the survey was administered was approximately 350. After one follow up electronic mail message, a total of 67 individuals responded, representing a 19% responding rate. After removing those providing incomplete information, the number was reduced to 59 – representing 40 different management departments. Our sample was diverse in terms of gender (38 males, 21 females), age (12 under 30, 29 between 30 and 39, 15 over 40, 3 not reporting), departments of management represented, and research activity/products. The list of institutions represented in the sample is shown in the [Appendix](#).

Measures

Research activity. Bauer and Green's (1994) measure of research activity was adapted for use in the study. The seven item, five point, Likert-type scale contains items asking the respondent about the degree to which they have engaged in various research activities over the course of doctoral studies (1, not at all; 5, very often). These include such things as working with a faculty member on his or her research project, writing a research paper as a sole author, collecting data for a research project, and analyzing data for a research project. Cronbach's Alpha for this measure was .77.

Research products. In order to measure research products we adopted an approach that would ensure adequate variance and consideration of both quantity and quality dimensions. First, for each respondent, we counted each of the following types of research products: refereed publications, revise and resubmit manuscripts, under review manuscripts, other publications (e.g., book chapters), and national conference presentations – given that conference presentations often represent a lower hurdle for students and because most students are supported in sharing their research at conferences (Golde & Dore, 2001).

Next, weights were developed to reflect the quality of each research outcome. The weights were derived from a survey of six faculty members at a major research institution each of whom had served as an editorial board member for at least one leading management journal. The first weight concerned the quality of the research outlet. Each of the faculty members was asked to sort the list of journals represented in our sample into 'A', 'B', and 'C' tiers ('A' representing the highest quality) and to assign each journal a score from 1-100. Based on the relationship between the numerical ratings

across tiers, the following weights were assigned to the outlets: 'A' tier journals were assigned the value 10, 'B' tier journals 5, and 'C' tier journals 2. Book chapters and national conference presentations were rated 1.5 and 1 respectively to denote their relatively lower significance. The second weight addressed the type of research outcome. The judges were asked to rate several generic research outcomes such as 'A publication', 'A revise and resubmit', 'A under review', other publications, and national conference presentation on a scale from 1-100. Following the same procedure, the following values were assigned to different types of outcomes: publication, 2; revise and resubmit, 1.5; under review, 1; other publications, 1.25; and national conference presentations, 1.

Finally, the two weights were applied to the research product counts and the results for each respondent's research outcome were then added to arrive at one research product score for each respondent. The measure was normally distributed with a mean of 21.6 and a standard deviation of 18.6. The research product scores were distributed as follows: 12 below 10, 19 between 11 and 20, 14 between 21 and 30, and 14 above 30.

Goals set by the student's chair. To measure the extent to which research-related goals were set for the student by his or her chair, a three item, seven point, Likert-type scale (1, strongly disagree; 7, strongly agree) was developed. The items were designed to measure the extent to which the student's chair had assigned them specific and challenging goals (i.e., obtaining what are typically considered difficult and valued goals in a management Ph.D. program). The items include: 'My chair told me that one of my goals should be to attain as many quality publications as possible while I am a doctoral student', 'My chair told me that one of my goals should be to attain as many conference presentations as possible while I am a doctoral student', and 'My chair told me that one of my goals should be to gain employment at a research-oriented institution after I leave my doctoral program'. Cronbach's Alpha for this measure was .84.

Intrinsic motivation. The scale used to measure intrinsic motivation was developed for this study. It consists of five items using a seven point Likert-type scale (1, strongly disagree; 7, strongly agree). The questions were designed to measure the respondent's interest and enjoyment of research as a part of the doctoral program. Sample items include: 'I enjoy the various tasks involved in conducting research projects' and 'I feel driven to do research because I genuinely like the tasks involved'. Cronbach's Alpha for this measure was .89.

Information seeking. Information seeking was measured with an eight item, seven point (1, strongly agree; 7, strongly disagree), Likert-type scale adapted from Morrison (1993). Two items each measure four dimensions: normative information, technical information, performance information, and seeking advice or critiques from faculty of research work. Items include: 'When I am developing

my work I often seek advice and critiques from the faculty' and 'I have sought out information from the faculty concerning the use of statistical techniques or methodologies'. Cronbach's Alpha for this measure was .84.

Prior research experience. Prior research experience was included in the study as a control variable. Bauer & Green (1994) found that prior research experience was positively related to doctoral students' current research activities, professional involvement, and publication success. We adapted Bauer & Green's (1994) measure to better fit a management student sample. The measure included eight items using a five point Likert-type scale (1, not at all; 5, very often) and asked the respondents' how often they had engaged in various research activities prior to starting their doctoral program. Items include such activities as working with a faculty member on his or her research project, conducting a research project alone, submitting a journal article, and having an article published. Cronbach's Alpha for this measure was .79.

Department ranking. A ranking of the quality of the management department where each respondent was trained was included as a control variable. We included a department ranking so that we could control for other school-related variables that might influence the relationships we examined (e.g., the influence of faculty colleagues on student research). Trieschmann, Dennis, Northcraft, and Niemi (2000) provided rankings of research productivity for many management departments. This work did not include all schools in our sample, but a larger list of rankings provided by these authors did include all of the schools in our sample and was used in the study. Lower scores indicate higher departmental research productivity. For the forty schools represented in our sample, rankings ranged from 2 to 301. Nine schools received top 30 rankings, 19 schools were ranked between 31 and 100, and 12 schools were ranked above 100.

Results

Descriptive statistics and correlations among all of the study variables are shown in Table 1 below. The correlations suggested that information seeking was highly related to two other study variables – chair goals and research activity. In order to test the validity of this measure we conducted a series of confirmatory factor analyses (CFAs) on these three measures. We developed a series of 1-factor, 2-factor, and 3-factor models standing in nested sequence (depending on the hypothesized factor structure of the measures) and conducted chi-square difference tests to evaluate which model better fit the data (Anderson & Gerbing, 1988; Kelloway, 1998; Smidts, Pruyn, & Van Riel, 2001). We found that the hypothesized factor structures provided a better fit to the data than any reduced model. For example, the hypothesized 3-factor (research activity, chair goals, and information seeking) model provided a significantly better fit than a 1-factor model ($\chi^2_{\text{difference}}(3) = 20.17, p < .001$), a 2-factor (combining research activity and information seeking) model ($\chi^2_{\text{difference}}(1) = 22.64, p$

< .001), and another 2-factor (combining chair goals and information seeking) model ($\chi^2_{\text{difference}}(1) = 5.11, p < .05$). With the exception of one item for the research activity measure, all of the items significantly loaded on their underlying common factors. Consequently, this analysis indicates that information seeking has discriminant validity.

TABLE 1
Means, Standard Deviations, and Correlations

Variables	Mean	s.d.	1	2	3	4	5	6
1. Prior Research Experience	1.58	.76	-					
2. Department Rank	74.40	76.60	.22	-				
3. Research Activity	3.36	.80	-.03	-.26*	-			
4. Research Products	21.60	18.66	-.16	-.14	.44**	-		
5. Chair Goals	4.74	1.73	-.09	-.06	.51**	.18	-	
6. Intrinsic Motivation	5.50	1.19	.00	.05	.11	.35**	.08	-
7. Information Seeking	5.11	1.06	-.29*	-.08	.45**	.27*	.45**	.07

Note: N=59.

*p < .05

**p < .01

Formal tests of the hypotheses were conducted using regression analyses. The results for Hypotheses 1-3 are shown in Table 2 below.

TABLE 2
Regression Results – Hypotheses 1-3

Variables	R ²	_R ²	F _{change}	–
Step 1 - Control Variables	.06	.06	1.58	
Prior Research Experience				.11
Department Rank				-.22
Step 2 - Independent Variables	.40**	.34**	8.72**	
Chair Goals				.41**

Intrinsic Motivation	.04
Information Seeking	.28*

Note: N=59. Beta weights are reported for the final step in each model.

*p < .05

**p < .01

The first hypothesis suggests that goals set by the student's chair will be positively related to the student's research activity. This hypothesis was strongly supported ($\beta = .41, p < .01$). Hypothesis 2 states that intrinsic motivation for research activity will be positively associated with research activity. This hypothesis was not supported. Hypothesis 3 states that information seeking will be positively associated with research activity. The data supported this hypothesis ($\beta = .28, p < .05$).

Earlier we described the relationship between chair goals and research activity. Further consideration of this relationship leads to the post-hoc consideration of an additional possibility. If goals function to direct attention and focus effort, it is likely they will drive the incidence of information seeking, particularly in a work context where it is not immediately clear how to achieve stated goals. That is, even assuming complete goal clarity, if no standard path to goal achievement exists – as is the case in conducting research – one is likely to engage in information seeking. For example, assume that a chair gives a student the goal of publishing a paper in the field's best journal. While this goal may be perfectly clear, it is not so obvious how to achieve this feat – as an untold number of scholars could attest. Thus, it may be through information seeking that chair goals influence research activity and research products.

In order to test this possibility, the standard procedure for assessing mediated models via regression analyses was applied (e.g., Barron & Kenny, 1986; James & Brett, 1984). A variable functions as a mediator when variations in the independent variable (i.e., chair goals) significantly account for variations in the proposed mediator (i.e., information seeking), variations in the mediator significantly account for variations in the dependent variable (i.e., research activity), and, when controlling for the mediator, a previously significant relationship between the independent variable and the dependent variable decreases or becomes insignificant. One can test these conditions by regressing the mediator on the independent variable, regressing the dependent variable on the independent variable, and regressing the dependent on both the independent variable and the mediator (Barron & Kenny, 1986). All three of these regressions are shown in Table 3 below.

TABLE 3
Regression Results – Information Seeking as a Mediator

Variables	Model 1 Information Seeking	Model 2 Research Activity	Model 3 Research Activities
Control Variables			
Prior Research Experience	-.26*	.03	.11
Department Rank	-.03	-.22	-.22
Independent Variables			
Chair Goals	.44**	.53**	.41**
Intrinsic Motivation	.05	.05	.04
Mediator			
Information Seeking			.28*
R ²	.30**	.34**	.40**
_R ²			.06*

Note: N=59. Beta weights are reported for the final step in each model.

*p < .05

**p < .01

In the current sample, information seeking partially mediated the effect of chair goals on research activity. Model 1 indicates that chair goals were positively related to information seeking ($\beta = .44$, $p < .01$), the proposed mediator. Model 2 indicates that chair goals were significantly related to research activity when information seeking was not in the equation ($\beta = .53$, $p < .01$). Finally, in Model 3 the regression coefficient for information seeking was significant in contributing to research activity after controlling for the independent and control variables. The decreased, yet still statistically significant ($\beta = .41$, $p < .01$), coefficient for chair goals in Model 3 indicates that information seeking partially mediated the relationship between chair goals and research activity.

The final hypothesis, Hypothesis 4, states that research activity mediates the relationship between the antecedents and research products. Table 4 below provides the full test of mediation following the procedure noted above (Barron & Kenny, 1986; James & Brett, 1984).

TABLE 4
Regression Results – Hypothesis 4

Variables	Model 1 Research Activity	Model 2 Research Products	Model 3 Research Products
Control Variables			
Prior Research Experience	.11	.02	-.01
Department Rank	-.22	-.27*	-.19
Independent Variables			
Chair Goals	.41**	.00	-.15
Intrinsic Motivation	.04	.32*	.30*
Information Seeking	.28*	.35*	.25
Mediator			
Research Activity			.37*
R ²	.40**	.32**	.40**
_R			.08*

Note: N=59. Beta weights are reported for the final step in each model.

*p < .05

**p < .01

The results indicate that intrinsic motivation ($\beta = .32$, $p < .05$) and information seeking ($\beta = .35$, $p < .05$) were positively associated with research products. Further, information seeking was fully mediated by research activity: information seeking was positively related to research activity ($\beta = .28$, $p < .05$), was positively related to research products ($\beta = .35$, $p < .05$) when research activity was not in the equation, and when both variables were included, the effect of information seeking became insignificant while research activity manifested a large effect ($\beta = .37$, $p < .05$). Thus, Hypothesis 4 received partial support.

Discussion

The results provided an interesting pattern of findings that shed light on both research activity and research products as well as the relationship between them. In terms of factors related to research activity, chair goals and information seeking had significant effects.

The strong effect of chair goals on research activity provides evidence supporting the importance of the chair role for student development (Cable & Murray, 1999; Crane, 1965; Reskin, 1979) and lends support to the efficacy of goals in the context of creative work (Shalley, 1991, 1995). However, our examination of goals in this context is only an initial step. Can goals be too difficult, not difficult enough, not clear enough – and thus not accepted or internalized by the student? How should one define a "specific" goal in the context of student research? Future research will be required to address these issues.

Our analysis also indicated that information seeking partially mediated the relationship between chair goals and research activity. This suggests that beyond simply setting research-related goals, a chair should expect that these goals will spur information seeking as the student grapples with the complex and ambiguous nature of conducting research. This finding is important and suggests that information seeking deserves further consideration as a key link through which chair goals might influence research activity. In fact, to our knowledge, this is the first time that information seeking has been linked to creative work. However, several questions remain to be addressed. What is the role of timing and quantity relative to information seeking? Further, is there variance in chairs' willingness to share information? The data were not sufficient to answer these questions, suggesting productive avenues for future research.

It is surprising that intrinsic motivation did not have a significant effect on research activity. This result might be explained by suggesting that, even if intrinsically motivated, the student may lack the requisite opportunities to engage in research, which often stems from collaborations with faculty colleagues. However, this statement is speculative and further research is warranted on this issue. In contrast, intrinsic motivation was positively associated with research products. This suggests that it is those students possessing strong intrinsic motivation who tend to persist and stay focused such that research products eventually result. This explanation is consistent with research linking intrinsic motivation with persistence (Oldham & Cummings, 1996; Zhou, 1998) and creativity (e.g., Amabile, 1983; Deci & Ryan, 1985). This finding is significant because while it has long been stated that intrinsic motivation is integral to creativity (Amabile, 1983; Deci & Ryan, 1985), little research has demonstrated this relationship outside of a laboratory setting (although see Tierney, Farmer, & Graen, 1999; Shin & Zhou, 2003).

Interestingly, although not hypothesized, chair goals were not associated with research products. This may be explained by suggesting that direction provided by the student's chair via a specific and challenging goal is only instrumental in getting the student involved in research activities. However, chair goals may not be sufficient to move the student towards completed research products. In addition, this can be explained by the stochastic and time consuming nature of the journal review process. That is, even clear

goals and amazing efforts do not guarantee publications in the relatively short duration of a doctoral program. Thus, consistent with the creativity literature, our data indicate that the most important factors relative to research products are research activity and intrinsic motivation.

Finally, the results also demonstrated that research activity mediates the effect of information seeking on research products. This may be interpreted to mean that while information seeking is clearly an important behaviour for students engaged in the research process, it is most salient to the extent that it helps the student foster a body of research activity. This follows from the contention that creativity is a protracted process of creative engagement with many intermediate stops in the journey towards creative products (e.g., Albrecht & Hall, 1991; Drazin et al., 1999, Osborn, 1957).

However, future research must more clearly explain the nature of the relationship between research activity and research products. What additional variables might explain the transformation of research activity into final research products? For example, has the student worked on research projects with faculty co-authors? In particular, are any co-authors successful researchers or editorial board members with significant experience in the publishing process? Additional research is necessary to address these possibilities.

With regard to the control variables included in the analysis, it is noteworthy that both prior research experience and department ranking manifested no significant effects, with one exception. Prior research experience was negatively related to information seeking, possibly suggesting that students with prior research experience had less need to seek information. The lack of findings for department rank is also interesting, and possibly a bit more perplexing. Notwithstanding the suggestion that departments vary in quality, in our sample, rank had no significant effect, even though there appears to be meaningful variance in the array of schools comprising the sample. We would speculate that the quality of the department only matters past some very high threshold. Nonetheless, given the importance of the department in shaping the student's development, the issue merits further investigation.

It should be noted that our study is not without limitations. The sample represented only 19 percent of the population of interest; this small size thus limited the number of factors that could be considered. It should also be noted that our sample contained only Management doctoral students. While it is plausible that the findings here are applicable to doctoral students in other disciplines, future research will be required to test this possibility. The survey was also cross-sectional, which does not allow for the examination of temporal relationships such as, for example, the relationship between research activity and research products over time. In addition, the analyses reported here do not test causality, only association. It is entirely possible that bi-directional relationships exist among the variables

examined. Future research utilizing methodological approaches designed to specifically test causality in a longitudinal context is certainly in order. Finally, the data used in this study were obtained from one source, suggesting the possibility of common method bias. While the findings appear worthwhile, it will clearly be important for future research to expand the focus to include data collected from student's chairs in addition to the students themselves.

Several practical implications of these findings are also worth noting for both doctoral students as well as dissertation chairs and department heads. First, students may be wise to focus their research efforts, their dissertation research in particular, on subject matter that they find deeply interesting. Given the role of intrinsic motivation in creative performance and the findings in this study suggesting that intrinsic motivation is associated with research products, students should consider focusing on topics personally meaningful to them. Students will also benefit from actively seeking information. Assuming that a student has had little or no research training prior to beginning doctoral studies, seeking information about expected behaviours, unclear technical information, and performance feedback information should all prove useful.

Next, students must take great care in selecting their advisor/chair, as this may represent the most important decision they will make in graduate school (Lovitts, 2001) and because the literature suggests that many students are not satisfied with their advisor relationship (Golde & Dore, 2001). Given that one strategy for successful entry into a publishing-oriented profession is to establish relationships with credible mentors who can help the student through the research process (Graham & Stablein, 1985), it is important that future research consider the dimensions of the advisor relationship and how they might influence key student outcomes such as research productivity. For example, we would speculate that advisor accessibility and demonstrated interest in the student will be important student concerns.

Finally, our results might suggest one additional tentative implication for students. Taylor et al (1984) found that research productivity increases when faculty work on multiple projects simultaneously. In the current study, students with higher levels of research activity are very likely working on multiple projects and, given the association between research activity and outcomes, this suggests that students may benefit from engaging multiple research projects at one time. While we suspect that this is common for many doctoral students, it may not be universally true.

Regarding advisors/chairs and department heads, similar implications should be considered. First, given the important function of chair goals, it is vital for faculty members in this role to actively engage in the goal setting process. While many chairs undoubtedly do, our findings indicate that such a practice would be beneficial for any student with the goal of obtaining high quality publications and

research-oriented positions post graduation. Also, the findings regarding information seeking suggest that students will benefit when high quality faculty serve as information resources and are willing to provide useful feedback to students. Assuming that all chairs are not equally accessible or available, it would be useful for them to communicate to their students that they are open to this form of behaviour. Clearly, department heads will play an important role in fostering this process.

The current study was exploratory in nature and there is a considerable amount of future research which appears worthwhile. Aside from the topics noted above, several others merit attention. For example, additional contextual and personal factors will be interesting to consider. Does the student have a fellowship? Is the student pursuing the degree full-time or part-time? To what extent do teaching responsibilities help or hinder the student's research efforts? What about the role of research assistantships? These factors may have implications for student motivation to engage in research. In terms of personal characteristics, one might consider need for achievement or openness to experience. The former may be linked to the persistence and effort required for success in a doctoral program and the latter may be beneficial because of the creative nature of research.

In summary, we hope that our findings have increased our understanding of scholarly endeavours, supported and expanded our knowledge of creativity, and provided information useful to doctoral students and faculty members directing doctoral programs in Management. As our results suggest, there is still much work to be done.

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Appendix

Auburn University
Boston College
Boston University
Georgia State University
Louisiana Tech University
Mississippi State University
New Mexico State University
Northwestern University
Ohio State University
Pepperdine University
Purdue University
Rutgers University
Southern Illinois University at Carbondale
Stanford University
State University of New York at Albany
State University of New York at Binghamton
Temple University
Texas A&M University
The Union Institute
University of Alabama at Birmingham
University of California at Los Angeles
University of Cambridge
University of Colorado at Boulder
University of Florida
University of Kansas
University of London
University of Maryland
University of Memphis
University of Minnesota
University of Missouri at Columbia
University of North Carolina at Chapel Hill
University of Oklahoma
University of Oregon
University of Pennsylvania
University of Pittsburgh
University of South Carolina
University of Texas at Dallas
University of Utah
University of Wisconsin-Madison
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