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Linking exploration to academic performance: The role of information seeking and academic self-efficacy

Panagiotis Gkorezis, Petros Kostagiolas, Dimitris Niakas,

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Linking exploration to academic performance

The role of information seeking and academic self-efficacy

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Panagiotis Gkorezis

Hellenic Open University, Patras, Greece

Petros Kostagiolas

Department of Archives and Library Science, Ionian University, Corfu, Greece, and

Dimitris Niakas

Faculty of Medicine, National and Kapodistrian University of Athens, Athens, Greece

Abstract

Purpose – Substantial empirical research has addressed the antecedents of students' academic performance. Building on these insights, the purpose of this paper is to extend the related literature by investigating the impact of students' exploration on their academic performance. Furthermore, to provide a better understanding of this relationship the authors incorporate two sequential mediators, namely, information seeking and academic self-efficacy.

Design/methodology/approach – Quantitative approach using self-report questionnaires. This study was conducted in the Hellenic Open University through a specially designed questionnaire. The authors collected data from 248 students attending a postgraduate course in Healthcare Management.

Findings – The results showed that information seeking and in turn academic self-efficacy mediate the positive association between exploration and academic performance. Both theoretical and practical implications are also discussed.

Originality/value – Students' exploration plays an important role in enhancing both their information seeking and self-efficacy which in turn affects their academic performance.

Keywords Academic performance, Exploration, Information seeking, Academic library, Hellenic Open University, Academic self-efficacy

Paper type Research paper

Introduction

Considerable research attention has focused on examining the determinants of students' academic performance (Brown *et al.*, 2008; Cassady and Johnson, 2002; Duckworth and Seligman, 2005; Flook *et al.*, 2005; Hanus and Fox, 2015; Liem *et al.*, 2012; Nurmi *et al.*, 2003; Pintrich and De Groot, 1990; Tang and Austin, 2009). In this vein, scholars have pointed to the vital role of dispositional factors in triggering academic performance (Chamorro-Premuzic and Furnham, 2003; O'Connor and Paunonen, 2007; Poropat, 2009). However, little is known about the role of exploration which describes individuals' tendency to seek out novel information, knowledge and experiences (Kashdan *et al.*, 2004). Thus, we attempt to extend previous research by investigating the relationship between students' exploration and their academic performance.

In addition, to provide a better understanding of the above relationship we encompass two mediating mechanisms, namely, information seeking and academic self-efficacy. Both constructs have been broadly used in the related literature as important antecedents of academic performance (Andrew, 1998; Lane *et al.*, 2004; Lent *et al.*, 1986; Tang and Tseng, 2013; Zhu *et al.*, 2011). Information seeking investigation in academic environments includes numerous theoretical and empirical studies (Cerretani *et al.*, 2016) all striving to associate



individuals' (students, academics and researchers) behavior toward information with their cognitive and emotional assimilation to the academic environment (Mokhtari, 2014). Further, self-efficacy has been defined as the "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura 1997, p. 3). A recent study has demonstrated that self-efficacy may serve as a mediator in the relationship between information seeking and high school students' academic performance (Zhu *et al.*, 2011). Following the above studies, we utilize information seeking and academic self-efficacy as important lens to examine the impact of exploration on academic performance. Taken together, a three-path mediation model is developed and tested which relates exploration to academic performance through information seeking and, in turn, academic self-efficacy (Figure 1).

This study aims to contribute to the literature in several ways. First, we add to the academy performance literature by examine the effect of an unexplored dispositional factor, exploration, on students' academic performance. Second, we provide important insight into the processes that explain this indirect effect by highlighting the mediating role of information seeking and academic self-efficacy. Third, using a sample from an Open University, we also add to the limited empirical studies on distance learning students' academic performance. Fourth, we contribute to the limited empirical research on students' exploration by exploring its effect on both information seeking and academic self-efficacy.

Theory and hypotheses

Exploration, information seeking, academic performance

Information searching is a sequence of actions aiming to satisfy various core needs (affective, cognitive and physiological) which are generated by the demands created within a set of contexts (e.g. individual, work-life or the broader socio-cultural and politico-economic environment). During this process, in the academic context, students' affective and cognitive states are changing and their existing information structures are constantly enriched due to their exposure to more information.

Within the academic context, information seeking is taking place in a highly complex information environment involving the usage of online scholarly information systems and services (Case, 2012; Cerretani *et al.*, 2016). As a matter of fact, students constantly face academic challenges that require usage, interpretation and evaluation of scholar information. This constant necessity to satisfy their scholar information needs is influenced (Mokhtari, 2014) by situational (e.g. provision of library services, a specific academic environment) and personal factors (e.g. student's personality). Indeed, contributing factors to knowledge sharing for performance and learning of university students have been studied.

Therefore, over the last decades a rich body of literature has been made available striving to understand the affective components that influence students' information seeking (Bronstein, 2014; Nahl and Bilal, 2007; Savolainen, 2015). Indeed, this research quest involves many different facets including the role of emotions toward uncertainly (Wilson, 2006), as well as the role of personality characteristics (Yan *et al.*, 2015) when seeking information (Hyldegard, 2009). Our study focuses on exploration which is considered to be the individuals' "appetitive strivings for novelty and challenge" (Kashdan *et al.*, 2004). Exploratory tendencies according to Berlyne (1978) involve a diversive curiosity, which is an active seeking out of

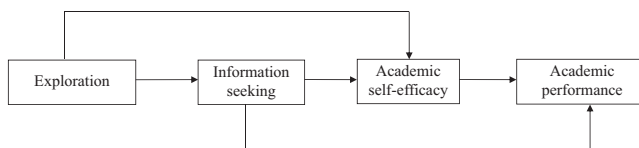


Figure 1.
The hypothesized
model

sources of novelty, and a specific curiosity which actively seeks high levels of knowledge and experience for accomplishing a particular aim. Based on the above, exploration is important for students' in order to efficiently and effectively dwell into the academic information universe. Hence, the following hypothesis is formulated arguing that students' explorative characteristics are likely to augment their information seeking behavior:

H1. Exploration is positively related to information seeking.

An extensive body of research involves the impact of using libraries (Whitmire, 2002) and information services, scholarly databases, various social networks and other online information resources on students' performance. This area of knowledge is rich due to the nature of academia which requires the extensive exploitation of online information technologies and systems by individuals. The information provided online through various scholar resources, as well as the extensive information exchange among scholars has become a decisive factor related to their performance and accomplishments. As regards the former, scholars have demonstrated that internet information seeking is positively related to students' academic performance (Zhu *et al.*, 2011). Therefore, based on the above theoretical and empirical arguments we form the following hypothesis:

H2. Information seeking is positively related to academic performance.

According to our previous hypotheses, we have suggested that exploration is positively correlated with information seeking (*H1*). Moreover, information seeking positively affects academic performance (*H2*). Combined, we suggest that information seeking will mediate the link between exploration and academic performance:

H3. Information seeking mediates the relationship between exploration and academic performance.

Exploration, academic self-efficacy, academic performance

Exploration pertains to discovery, experimentation and risk taking (Spreitzer *et al.*, 2005). Specifically, it refers to the "orientation toward seeking novel and challenging objects, events, and ideas with the aim of integrating these experiences and information" (Kashdan *et al.*, 2009, p. 988). On this basis, scholars have argued that it inherently contributes to personal growth (Kashdan *et al.*, 2009). Along similar lines, empirical research has indicated that exploration is positively related to thriving at work which is a combined psychological state of vitality and learning (Niessen *et al.*, 2012). As regards the former, Spreitzer *et al.* (2005) mentioned that exploration enhances vitality because when employees explore new ways of doing things they feel more curious and, therefore, experience higher levels of energy. Further, the positive relationship between exploration and learning is attributed to the active learning approach which underscores the significant role of exploration and experimentation in the learning process (Bell and Kozlowski 2008). Namely, exploring new ways, ideas and strategies may lead individuals to ameliorate their knowledge and skills.

Drawing on the above reasoning, we propose that students' exploration is likely to result in higher academic self-efficacy. Specifically, it is argued that when students are apt to seek new knowledge and ideas they will attempt to broaden their repertoire of information and knowledge regarding their course which, in turn, will augment their sense of growth and learning. In this regard, when students work on tasks and recognize their progress in learning and skills they experience an increased sense of self-efficacy (Schunk, 1991; Pajares and Schunk, 2002). As noted above, exploration may also promote positive emotions. In this vein, scholars have suggested that individuals' positive emotions and mood are likely to foster greater levels of self-efficacy (Bandura, 1982; Kavanagh and Bower, 1985). In a similar sense,

Pekrun *et al.* (2002) have demonstrated that such academic emotions may promote, among others, students' sense of self-efficacy. Hence, based on the foregoing theoretical and empirical argumentation we posit that students' exploration will increase their levels of self-efficacy:

H4. Exploration is positively related to academic self-efficacy.

Bandura (1977, 1997) has argued that self-efficacy affects performance through a host of affective, cognitive and motivational processes including goal setting, effort, persistence and emotional reactions. That is, self-efficacious individuals may choose to set difficult and challenging goals, put additional and persistent effort and experience lower levels of stress, anxiety and depression. Empirically, the linkage between self-efficacy and task performance has been substantially shown at the between-subjects level (Judge *et al.*, 2007; Stajkovic and Luthans, 1998; Vancouver and Kendall, 2006; Yeo and Neal, 2006).

Interestingly, self-efficacy has been perceived as a salient construct in training and learning settings. As regards the latter, Zimmerman (2000) highlighted the positive role of self-efficacy in affecting academic outcomes. Thus, students with high levels of self-efficacy "participate more readily, work harder, persist longer, and have fewer adverse emotional reactions when they encounter difficulties than do those who doubt their capabilities" (Zimmerman, 2000, p. 86). In this sense, numerous empirical studies have corroborated these arguments by associating students' self-efficacy with their academic performance (Choi, 2005; Multon *et al.*, 1991; Chemers *et al.*, 2001; Turner *et al.*, 2009; Wang and Newlin, 2002; Wood and Locke, 1987; Zhu *et al.*, 2011). Therefore, in line with the above research we propose that students' self-efficacy will result in increased academic performance:

H5. Self-efficacy is positively related to academic performance.

Thus far, we have proposed that exploration affects self-efficacy (*H4*) and the latter is associated with academic performance (*H5*). In addition, several scholars have highlighted the mediating role of self-efficacy in linking various determinants to performance (Bandura, 1986; Pajares and Miller, 1994; Yeo and Neal, 2006; Zhu *et al.*, 2011; Zimmerman, 2000). Paired together, we suggest self-efficacy will serve as a mediator in the relationship between exploration and academic performance:

H6. Self-efficacy mediates the relationship between exploration and academic performance.

Exploration, information seeking, academic self-efficacy, academic performance

In this study, we hypothesized that exploration has an indirect effect on academic performance through both information seeking and academic self-efficacy. Integrating these two underlying mechanisms leads to a three-path mediation model which proposes that exploration influences academic performance via information seeking and, in turn, academic self-efficacy:

H7. The relationship between exploration and academic performance is sequentially mediated by information seeking and self-efficacy.

Method

Participants and procedure

Data were collected from students who attended a master course at the Hellenic Open University. The authors utilized a paper questionnaire which allocated to all the students. In aggregate, from the total number of 410 students 248 answered the questionnaire. Therefore, the response rate was 60.5 percent. Among the respondents, 54 percent were female and the mean age was approximately 37 years. In addition, 46.0 and 40.3 percent held a Technological and University degree, respectively.

Measures

All measures, except for information seeking, used a five-point Likert scale where 1 = strongly disagree and 5 = strongly agree. Information seeking utilized a five-point scale where 1 = never and 5 = very often. All scale reliabilities were acceptable, exceeding the value (0.70) recommended by Nunnally *et al.* (1967).

Exploration. Exploration was measured using the scale from Kashdan *et al.* (2004). An example item is “I frequently find myself looking for new opportunities to grow as a person.” The Cronbach’s α for this scale was 0.73.

Information seeking. Information seeking was assessed using five items. These items measured how often students seek information about subject-related issues. An example item is “How often do you seek information about management theories.” The Cronbach’s α for this scale was 0.77.

Academic self-efficacy. Academic self-efficacy was measured adapting the three-item scale from Spreitzer (1995). A sample item is “I am confident about my ability to do my academic tasks.” The Cronbach’s α for this scale was 0.84.

Academic performance. Academic performance was assessed using three items adapted from Williams and Anderson (1991). An example item is “Overall, I adequately completed assigned academic tasks. The Cronbach’s α for this scale was 0.89.

Control variables. We controlled for four demographic variables, including gender, age, education and employment status.

Results

Confirmatory factor analysis

We first attempted to assess both convergent and discriminant validity by performing confirmatory factor analysis (AMOS 20). Results (Table I) reported that our model provided a very good fit to the data ($\chi^2(84) = 117.30, p < 0.01, IFI = 0.98, CFI = 0.98, RMSEA = 0.04$). We also contrasted our model against similar models. According to the results, our model fitted data significantly better than alternative models and consequently we found support for the distinctiveness of our constructs. Furthermore, all standardized coefficients were significant demonstrating, thus, convergent validity. Last, the possibility of common method variance was examined utilizing Harman’s single factor test (Podsakoff *et al.*, 2003). Results revealed a poor fit for the single factor solution ($\chi^2(90) = 772.51, p < 0.01, TLI = 0.55, CFI = 0.55, RMSEA = 0.18$). Hence, it is likely that common method bias is not an important problem for the present study.

Hypotheses tests

Means, standard deviations, reliabilities and correlations for all variables are shown in Table II. We examined our present hypotheses using the bootstrapping technique (1,000 bootstrap

Model	χ^2	df	$\Delta\chi^2$	IFI	CFI	RMSEA
Four factor model	117.30	84		0.98	0.98	0.04
Three factor model: exploration and information seeking	307.31	87	190.01**	0.86	0.85	0.10
Three factor model: exploration and academic self-efficacy	276.32	87	159.02**	0.87	0.87	0.09
Three factor model: exploration and academic performance	301.97	87	184.67**	0.86	0.86	0.10
Three factor model: information seeking and academic self-efficacy	402.33	87	285.03**	0.79	0.79	0.12
Three factor model: academic self-efficacy and academic performance	390.53	87	273.23**	0.80	0.80	0.12
One factor model	772.51	90	655.21**	0.55	0.55	0.18

Table I.
Measurement model

Notes: IFI, incremental fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation. ** $p \leq 0.01$

samples with 95 percent confidence intervals) as suggested by Preacher and Hayes (2008). This technique allows us to encompass multiple mediators.

Results (Table III) demonstrated that exploration is positively associated with information seeking ($B = 0.30, p < 0.01$) and the latter is positively related to academic performance ($B = 0.24, p < 0.01$). Thus, $H1$ and $H2$ were supported. Similarly, $H3$, which stated that information seeking mediates the relationship between exploration and academic performance, was supported since the bias corrected confidence intervals of this indirect effect did not include zero (0.03 and 0.13). $H4$ proposed that exploration positively affects academic self-efficacy. Results indicated that this hypothesis was supported ($B = 0.38, p < 0.01$). Likewise, as predicted ($H5$) academic self-efficacy was positively related to academic performance ($B = 0.45, p < 0.01$). $H6$ suggested that academic self-efficacy mediates the association between exploration and academic performance. Results supported this indirect effect as the bias corrected confidence intervals did not contain zero (0.09 and 0.28). Last, our results found support for $H7$ which suggested that information seeking and academic self-efficacy sequentially mediated the effect of exploration on academic performance since the respective intervals did not include zero (0.01 and 0.06).

Discussion

In this study, we examined the indirect effect of students' exploration on their academic performance. The present results supported this proposition demonstrating that students' tendency to explore and seek out novel information and experiences result in enhanced performance regarding their academic tasks through two underlying mechanisms, namely, information seeking and academic self-efficacy. Our results showed that both variables acted as mediators, both in isolation and sequentially, accounting for the effect of exploration on academic performance.

	Mean	SD	1	2	3	4	5	6	7	8
1. Gender	0.54	0.50								
2. Age	37.14	6.64	-0.04							
3. Education	0.73	0.82	-0.08	0.07						
4. Employment	0.98	1.37	0.03	-0.19**	0.35**					
5. Exploration	4.27	0.58	-0.04	0.08	0.06	0.06	(0.73)			
6. Information seeking	4.15	0.70	-0.03	0.09	0.01	-0.13*	0.23**	(0.77)		
7. Academic self-efficacy	3.74	0.66	-0.20**	0.08	0.15*	0.05	0.37**	0.27**	(0.84)	
8. Academic performance	3.93	0.74	0.07	0.12	-0.06	-0.08	0.28**	0.34**	0.49**	(0.89)

Notes: Reliability coefficients appear in parentheses. * $p \leq 0.05$; ** $p \leq 0.01$

Table II.
Descriptive statistics,
reliabilities and
correlations

	Path coefficients		Indirect effects		
	Academic performance	Information seeking	Academic self-efficacy	Estimate	Bootstrap 95% confidence interval
Exploration (EXPL)	0.11 (0.08)	0.30 (0.07)	0.38 (0.07)		
Information seeking (IS)	0.24 (0.07)		0.23 (0.06)		
Academic self-efficacy (ASE)	0.45 (0.06)				
Total				0.27 (0.06)	0.16, 0.41
EXPL→IS→AP				0.07 (0.03)	0.03, 0.13
EXPL→ASE→AP				0.17 (0.05)	0.09, 0.28
EXPL→IS→ASE→AP				0.03 (0.01)	0.01, 0.06

Notes: All path coefficients are significant except for exploration→academic performance. Standard error in parentheses

Table III.
Path coefficients and
indirect effects for
mediation models

Theoretical implications

The present study extends prior research on students' academic performance in several ways. Although extant research has argued that dispositional factors may lead to increased academic performance (Chamorro-Premuzic and Furnham, 2003; O'Connor and Paunonen, 2007; Poropat, 2009) no prior study has addressed the role of students' exploration in ameliorating this core student outcome. Therefore, we add to this stream of research by showing the indirect effect of students' exploration on their academic performance.

In explaining this effect, this study also sheds light on the psychological mechanisms that relate students' exploration to their academic performance. More specifically, we highlight both information seeking and academic self-efficacy as important mediators. Despite the existing research on these factors as antecedents of students' academic performance (Choi, 2005; Multon *et al.*, 1991; Chemers *et al.*, 2001; Turner *et al.*, 2009; Wang and Newlin, 2002; Wood and Locke, 1987; Zhu *et al.*, 2011) little empirical evidence has examined their mediating role in linking students' personal characteristics to their academic performance. In a related sense, scholars have shown that academic self-efficacy plays a mediating role in the relationship between internet information seeking and students' academic performance (Zhu *et al.*, 2011). Building on and extending this work, we found that information seeking and academic self-efficacy may serve as important and consequential mechanisms that explain the effect of students' exploration on their academic performance.

In addition, exploration has received limited attention in the academic setting. As such, by demonstrating the positive association between students' exploration with their information seeking and self-efficacy we provide useful insight into the exploration literature. Last, the present study replicates previous empirical studies that have reported the positive relation between both information seeking (Zhu *et al.*, 2011) and self-efficacy (Choi, 2005; Multon *et al.*, 1991; Chemers *et al.*, 2001; Turner *et al.*, 2009; Wang and Newlin, 2002; Wood and Locke, 1987; Zhu *et al.*, 2011) and students' academic performance.

Practical implications

The present findings have some practical implications for parents and professors. Our study suggests that students with high levels of exploration result in elevated information seeking which, in turn, enhances academic self-efficacy and, ultimately, academic performance. Conversely, students with low exploration are likely to demonstrate decreased academic performance due to low information seeking and consequently low academic self-efficacy. In light of these findings, it is important for parents and professors to acknowledge and help students that have low exploration. For example, we showed that information seeking may lead to increased academic performance. Combined with the fact that health information is argued to play a pivotal role in health promotion (Wei, 2014) parents and professors could embolden and motivate these students to be more active *vis-à-vis* their willingness to seek pertinent information.

Moreover, the present study revealed that academic self-efficacy plays a significant role in increasing students' academic performance. As such, it is important for professors to pay attention to their students' academic self-efficacy. A significant tool for promoting students' academic self-efficacy relates to the use of verbal persuasion by professors. In his seminal work on self-efficacy, Bandura (1995) stated that social persuasion is "a way of strengthening people's beliefs that they have what it takes to succeed" and therefore "people who are persuaded verbally that they possess the capabilities to master given activities are likely to mobilize greater effort" (p. 4). In this regard, professors could use a positive language that will increase students' academic self-efficacy. In parallel, drawing on the Pygmalion effect (Rosenthal and Jacobson, 1968), professors could boost students' academic self-efficacy and in turn their performance by forming and communicating their expectations of them.

Limitations and future research

Despite its potential contribution, our study has some limitations that need to be addressed. Initially, this study used a cross-sectional approach and therefore it is difficult to assess the causality of the present relationships. Combining this design with the self-report and single-source data, our results may be prone to common method bias. Although we attempted to assess this phenomenon by conducting ex-posttest (Harman) which showed that method variance may not be a pervasive problem, we cannot eliminate this possibility. Furthermore, our data were drawn from students studying in a specific postgraduate course at an Open University which is characterized by the distant nature of the educational activities. Therefore, we should be cautious about the generalizability of our findings.

The above limitations suggest constructive directions for future research. First, longitudinal data could help overcome the issue of causality. Second, to address the possible common method bias effects future studies could utilize objective performance measures. Additionally, further research could replicate the present relationships in other contexts such as, mainstream educational courses or undergraduate students. Future studies may also investigate alternative mediating mechanisms in the linkage between exploration and academic performance. For instance, building on and extending the social embeddedness model of thriving at work (Spreitzer *et al.*, 2005) future studies could examine the mediating role of thriving in the aforementioned association. In a similar vein, further empirical research could provide additional insights into the present relationships by examining potential boundary conditions which may serve as significant moderators such as work-family balance or relationship with the professor.

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Corresponding author

Petros Kostagiolas can be contacted at: pkostagiolas@ionio.gr