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Preface

Instruction is the provisional state that has as its object to make the learner or problem-solver self-sufficient.
Jerome Bruner, 1966

Nearly fifty years ago, in *Toward a Theory of Instruction*, Bruner's classic statement created much discussion and controversy. The wisdom of his words becomes more apparent with every ensuing day as the avalanche of new information and technology continues to expand. Far more than our world of 50 years past, today's environment demands, not necessarily self-sufficient, but certainly self-directed, lifelong learners. How are they to meet the demands of this continual learning?

Certainly the still-far-too-prevalent approach of lecture or even lecture with discussion followed by what the learners refer to as a "multiple-guess test" is not an adequate preparation for lifelong learning. Rather, it increases learner dependence and promotes a shallow approach to learning focused on passing the test, passing the course, or obtaining a credential.

The articles in this issue all address the need to view educational settings not only as places where content knowledge and skills can be gained, but also as laboratories for facilitating the learners' acquisition of skills and attitudes that will prepare them for lifelong, self-directed learning. One article focuses on the graduate university level, two on the baccalaureate level, and one on an educational program offered for budding entrepreneurs.

Park and her colleagues report on their investigation of graduate medical educators' beliefs and attitudes about curricular approaches, with emphasis on strategic principles for promoting learner-centered competency development. They also examined the educators' interest in addressing any gaps they perceived in their programs in terms of using learner-centered strategies.

Boyer and Usinger, in a follow-up study to earlier research, examined pervasive barriers to improvements in self-directed learning across academic domains and a variety of course delivery mechanisms, developing a predictive model that can serve as a valuable framework for further research.

Post examined factors that served as barriers or aids to successful completion for individuals enrolled in an entrepreneurial learning program at a Small Business Development Center and explored the utility of Garrison's (1997) Self-Directed Learning Model as an aid to understanding the reasons for attrition among nascent entrepreneurs.

Golightly and Guglielmino report on the outcomes of an integrated PBL approach to geography instruction for prospective teachers as a means of increasing readiness for SDL. They note the research that indicates that readiness for SDL increases gradually over time and highlight the importance of incorporating transition structures when engaging learners to take more responsibility for their own learning.

These studies provide valuable insights that can contribute toward the realization of the ideal expressed by Bruner so many years ago.

Lucy Madsen Guglielmino, Editor

International Journal of Self-Directed Learning

Volume 12, Number 2, Fall 2015

CONTENTS

<i>Preface</i>	ii
<i>Perceived Gaps of Graduate Medical Educators in Practicing Learner-Centered Competency Development</i>	
EunMi Park, Howard W. Francis, David W. Eisele, Salem I. Noureldine, Dawn M. LaPorte, George I. Jallo, Gary J. Confessore, and Young J. Kim	1
<i>Tracking Pathways to Success: Triangulating Learning Success Factors</i>	
Naomi R. Boyer and Peter Usinger	22
<i>An Exploration of SDL as a Conceptual Model For Studying Nascent Entrepreneurs</i>	
Ernie Post	49
<i>Geography Students' and Student Tutors' Perceptions of Their Self-Directedness in Learning in an Integrated PBL Model: An Exploratory Study</i>	
Aubrey Golightly and Lucy Guglielmino	63

**PERCEIVED GAPS OF GRADUATE MEDICAL EDUCATORS IN
PRACTICING LEARNER-CENTERED COMPETENCY
DEVELOPMENT**

**EunMi Park, Howard W. Francis, David W. Eisele,
Salem I. Noureldine, Dawn M. LaPorte,
George I. Jallo, Gary J. Confessore, and Young J. Kim**

The primary objective of the study was to assess graduate medical educators' beliefs and attitudes on curricular approaches in the United States. In particular, we asked about the five strategic principles of curricular design for promoting learner-centered competency development. The secondary objective was to explore the efficacy of a professional development session in increasing the desired use of the five strategic principles. The survey study was conducted with 437 faculty and educational administrators who attended the 2013 Accreditation Council for Graduate Medical Education (ACGME) Annual Educational Conference. All of the respondents perceived gaps in their current practices in using all five principles. The knowledge-session group ($n = 220$) showed a stronger desire to change their current residency programs relative to the control group ($n = 217$). Findings suggest that there is value among faculty and educational administrators in graduate medical education in using five curricular principles for promoting resident-centered competency development. Offering professional development opportunities may be beneficial in influencing the attitudes and intent of educators.

Keywords: learner-centered, competency-based education, self-directed learning, lifelong learning, graduate medical education, and professional development.

With the rapidly increasing complexity of medical and surgical practices, continuous innovation in graduate medical education (GME) is important for delivering optimal patient care (Bell, 2009; Cooke, Irby, & O'Brien, 2010; Diethrich, 2012; Institute of Medicine, 2001; Sachdeva et al., 2007). One concern raised for assuring quality patient care and addressing safety issues is that competency after residency is insufficient (Bell, 2009, Institute of Medicine, 2001). In the late 1990s, the GME system was critically reviewed for lack of standardized education, lack of accountability in demonstrating educational achievement, and lack of preparation by medical education for physicians' lifelong learning. Based on these background issues, Manthous (2004) addressed the

need of GME renovation, and professional organizations and leaders sought a common vocabulary for teaching and evaluating medical competency; the Accreditation Council for Graduate Medical Education (ACGME) launched the Outcome Project. The direction toward competency-based education (CBE) was suggested for GME innovation (Bell, 2009; Carraccio, Wolfsthal, Englander, Ferentz, & Martin, 2002; Frank et al., 2010).

CBE demands measuring educational outcomes of resident competencies rather than counting education time and credits (such as years of specialty training, number of surgical procedures performed) (Carraccio et al., 2002). In 1999, the Accreditation Council for Graduate Medical Education (ACGME) and American Board of Medical Specialties (ABMS) set outcome-oriented standards in physician education and established six broad areas of core competencies for clinical practice: patient care, medical knowledge, interpersonal and communication skills, professionalism, practice-based learning and improvement (PBLI), and systems-based practice (Batalden, Leach, Swing, Dreyfus, & Dreyfus, 2002). PBLI emphasizes the improvement of patient care through enhanced professional competency based on constant self-evaluation and lifelong learning. Among other medical and surgical competencies, residents are expected to develop skills and habits for learning and personal improvement.

A decade later, in 2009, ACGME, ABMS boards, specialty colleges and academies, residency and fellowship program directors, and residents began to define assumed developmental-competency outcomes during residency, which were later called *Milestones*. The Next Accreditation System (NAS) policy of ACGME announced the plan for Milestones-driven quality assurance processes in 2013 (Nasca, Philibert, Brigham, & Flynn, 2012). Each specialty group set the expected levels of developmental competencies toward mastery (the Milestones). Since 2014, all programs are now required to apply the Milestones as behavioral markers for the progressive acquisition of competencies during residency. Each of the specialty boards should examine validities and reliabilities for assessing the Milestones. Emergency medicine (EM) is one of earlier specialty groups that implemented Milestones. Initial validity analysis reports that the EM Milestones are valid and reliable as an assessment instrument for competency acquisition.

More than required semi-annual evaluations using the Milestone metrics, CBE curriculums should offer intentional learning opportunities for promoting residents' milestone developmental processes. GME Faculty and residency program administrators are expected to acquire appropriate knowledge and skills on how to design and execute more effective curricular approaches (Dath & Iobst, 2010; Frankel, Eddins-Folensbee, & Inui, 2011). Either autonomously or by responding to accreditation forces, this requires educators and leaders' readiness to support and to participate in the effort for curricular changes. However, many barriers hinder educational innovations. While removing environmental barriers (e.g., organizational structure and culture promoting innovative vision and collaborations; resource constraints) is important to improve the quality of residency training programs, enhancing insufficient skills among stakeholders is essential (Philibert et al., 2010; Philibert, Patow, & Cichon, 2011). This survey study examines GME faculty and education administrators' internal readiness to engage in curricular innovation efforts.

Based upon the theories of reasoned action and planned behavior (Ajzen, 1991; Hale, Householder, & Greene, 2002), there are known proximate determinants of behaviors such as beliefs, attitudes, and behavioral intentions for changes. In general, mandatory accreditation requirements may induce frustration and skepticism in stakeholders, which may subsequently hinder needed directional changes (Coverdill et al., 2011; Greenfield & Braithwaite, 2008; Pongpirul, Sriratanaban, Asavaroengchai, Thammatach-Are, & Laoitthi, 2006). We do not know if there are potential drawbacks under the increased culture to evaluate residency programs narrowly focusing on competencies rather than to promote broader educational approaches for supporting individual learners' development of their attributes and skills for self-directed, lifelong learning beyond the residency. The value GME practitioners (i.e., faculty and educational administrators for this study) place on certain curricular approaches could provide insight into their readiness to practice CBE. It is, therefore, important to understand stakeholders' current values and intentions with regard to curricular innovation approaches.

According to Pratt and Associates' classification (1998), there are five qualitatively different perspectives on teaching. Each perspective emphasizes distinctive beliefs, intentions, and actions in teaching:

1. A *transmission* perspective on teaching emphasizes the effective delivery of content.
2. An *apprenticeship* perspective on teaching highlights modeling ways of being;
3. The *nurturing* perspective on teaching focuses on the facilitation of self-efficacy itself.
4. *Social-reform* perspective on teaching emphasizes efforts for societal changes.
5. The *developmental* perspective on teaching focuses on cultivating individuals' ways of thinking for actions.

Different perspectives on teaching may be uniquely useful in promoting different natures of teaching effort and their outcomes. Among the different teaching perspectives, we pay more attention to the developmental perspective for preparing residents as proactive learners in their continued competency development efforts throughout their careers. The developmental perspective highlights the learner's point of view in the milestone development processes. The individual learners have the central responsibility for active engagement and management of their learning. The educator plays a strategic role in cultivating the learners' thoughts (or attitudes) in the achievement of educational and professional milestones. Since the focal point of the role among these faculty members is to promote the development of learners, some people refer to educational models that apply these principles as learner-centered education (LCE) (Lacasse, Lee, Ghavam-Rassoul, & Batty, 2009; Ludmerer, 2004; Wolpaw, Wolpaw, & Papp, 2003).

The developmental perspective, furthermore, promotes and welcomes individual learners' self-direction in learning and developmental processes. Accreditation agencies (ACCME, 2015; ACGME, 2013; LCME, 2015) in the continuum of U.S. medical education for medical students, residents, and practicing physicians have required or

promoted curricular effort that facilitates physician-learners to develop or utilize abilities to engage in self-directed, lifelong learning. A guiding framework has suggested that medical educators should aspire to facilitate self-directed learning experience in competency development throughout undergraduate medical education, specialty training, maintenance of certification, and continuing education. It is important to build the professional agency of residents toward becoming competent self-directed, lifelong learners. Based upon the perspective of the staged SDL model (Grow, 1991), teaching adult learners in education systems to be self-directed is possible by applying learner-focused curricular approaches matched to learner developmental phases, from dependent to self-directed. While educators' efforts may be insufficient for residents to be self-directed, lifelong learners, learner-centered curricular approaches are a necessary effort in educational settings because they require paying attention to resident developmental stages and increase the potential for development of self-directed learning (SDL).

The implementation of CBE by promoting learner experience in LCE and SDL requires the intentional thoughts and conscious ability of educators to support a developmental perspective on teaching and thoughtful provision of curricular opportunities. For example, intentional curricular opportunities may aim to promote residents' abilities to use their metacognitive skills and strategies for self-determination of learning goals and for self-monitoring and self-regulating their competency development status toward becoming independent professionals. It is often suggested to provide more self-assessment opportunities that learners can use to identify their learning needs, resources, goals, and milestone outcomes. We do not know, however, how the practicing communities of medical educators perceive and value specific curricular design strategies to facilitate competency development while promoting learner-centered processes and SDL experiences. We hypothesize for this survey study that GME faculty and educational administrators may have positive beliefs and attitudes toward applying five curricular approaches designed for resident-centered competency-improvement education promoting self-directed learning. In addition, their desire for curricular innovation using the studied curricular design principles may be increased after learning at a professional session on the related knowledge.

Methods

The Johns Hopkins University School of Medicine Institutional Review Board reviewed the present study (NA_00083970) for the required ethical approval.

Identification of the Five Curricular Design Strategies Surveyed

This study focused on five strategic principles in curricular design for promoting the resident-centered processes in learning and competency development. We searched six electronic databases of literature published in English since the 1960s: PubMed, EMBASE, CINAHL, ERIC, SCOPUS, and Web of Science. Our first search keywords included GME, competency, curriculum, and learner-centered. We then added the literature using the keywords of GME, competency, curriculum, and self-directed. After

removing duplicated abstracts using a web-based bibliographic software, RefWorks 2.0 (ProQuest, LLC, Bethesda, MD), we included reports on curricular models actually implemented in GME settings, while excluding theoretical reviews. We organized thematic principles by categorical coding and sub-categorical coding. Our appraisal and synthesis methods included independent coders, systematic comparisons using content analyses, and group discussions.

Beyond medical education literature, we also reviewed additional references reported about curricular models addressing LCE and SDL approaches in broad educational settings (Alexander & Murphy, 1998; Bransfor, Brown, & Cocking, 1999; Caffarella & O'Donnell, 1987; Candy, 1991; Confessore & Confessore, 1992; Cornelius-White, 2007; Doyle, 2008; Garrison, 1992; Henson, 2003; Jarvis, 2006; Kessels & Poell, 2004; Knapp, Bradley, & Fisher, 2010; Knowles, Holton, & Swanson, 1998; Lacasse et al., 2009; Lave & Wenger, 1991; McClusky, 1970; Mezirow, 2000).

We then identified five strategic design principles for promoting the developmental processes: (a) *Continuity of Learning*: serial learning experiences that occur throughout the developmental processes (Bruner, 1960; Colbert et al., 2012; Hirsh, Holmboe, & ten Cate, 2014), (b) *Assessing Milestones*: progressive assessment experiences throughout the milestone achievement journey (Evans, Zeun, & Stainer, 2014; Nasca et al., 2012; Pelgrim, Kramer, Mokkink, & van der Vleten, 2013), (c) *Ongoing Reflection*: ongoing reflection experiences on deliberate progression (Holmboe, 2014; Rackow et al., 2012; Schon, 1983), (d) *Mutual Accountability*: faculty members and residents' mutual accountability experiences in the shared journey of development processes (Balmer, Giardino, & Richards, 2012; Goldstein et al., 2005), and (e) *Team Accountability*: team accountability experiences among patient care teams (Baker, Gustafson, Beaubien, Salas, & Barach, 2005; Dedy, Zevin, Bonrath, and Grantcharov, 2013).

Development of Survey Questions for Assessing Educators' Value of Five Principles

Survey questions were initially field-tested with seven medical educators and two educational researchers. They reviewed survey readability, and the same people participated in the second test of response stability. For content validity regarding the use of five strategic principles for designing curriculums, they reviewed the relevance and appropriateness of the survey content and questions, as well as the respondents' ability to interpret and answer each question. On average, there was 97% agreement between the intended and actual interpretation of each survey item. Secondary reviews of the same survey questions presented in a different order were also performed to test the stability of the responses (ranking item test-retest Spearman $\rho > .98$; dichotomous item test-retest point biserial correlation coefficients $> .97$). In addition, we conducted subsequent interviews with the pilot survey respondents, in which we checked their comprehension of the survey questions across different times and settings (Groves et al., 2004).

The online survey was expected to require only 10 minutes. It consisted of three components: (a) current practice, (b) desired innovation, and (c) interest in professional development (see appendix). Regarding current practice and desired innovation with

respect to using the five educational strategies, participants responded using a 5-point scale ranging from 0 (“Never”) to 4 (“Always”). Regarding interest in professional development, participants responded using a 4-point scale ranging from 0 (“Not interested at all”) to 3 (“Very interested”). The questionnaire also included three dichotomous items (i.e., knowledge session attendance, and intention regarding current program modification in a desirable future direction). In addition, we included questions regarding the categorical characteristics of respondents (i.e., gender, role, and specialty).

Sampling Method

This study population of U.S. GME practitioners comprises faculty and educational administrators serving residency programs or institutional GME offices. During the 2011–2012 academic year (ACGME, 2012), the population served the 9,020 residency programs accredited by the ACGME, teaching 115,293 residents in 678 US institutions. The detailed demographic data for the GME practitioners were not available to report, in terms of the estimated population size and specified roles of residency program faculty members, program directors, institutional senior administrators, and institutional GME office coordinators.

To find a representative sample, we chose a representative professional meeting held by the authority organization in US GME accreditation, the ACGME Annual Educational Conference (AEC) held from February 28 to March 3, 2013, in Orlando, Florida. Informed consent was obtained from all respondents prior to their participation in the study. We sought voluntary participation in the online surveys using accessible mobile devices.

The intervention sample of knowledge-session participants was comprised of the audience at the session entitled “A Framework for Learner-Centered Milestone Achievement” presented at the same 2013 ACGME AEC. The control group consisted of participants who did not attend the knowledge session. We recruited the volunteers from other attendees of the ACGME AEC in the public areas designated for internet-access.

Based upon the survey respondent characteristics of the knowledge-session group, we identified a matched control group by application of a stratified sampling method. We systematically asked and identified random individuals who met the recruitment criteria for a control group: they (a) did not attend the knowledge-session, and (b) matched demographics needed for systematic recruitment. The employed strata were gender, specialty (i.e., surgical vs. nonsurgical program), and role (analyzed by institutional vs. residency program level). In order to compare the group responses, we attempted to balance the sample sizes by checking and matching the demographic characteristics throughout the data collection.

Data Collection and Analyses

We used a free web-based system (docs.google.com), to which respondents could upload the completed survey form from their own wireless mobile devices. We monitored the status of online data collection with respect to matching the comparison groups according to targeted demographics such as gender, specialty, and role.

Prior to the intervention of the knowledge session, we received the session register information provided by ACGME AEC to prepare our instructional activities for the audience. The instructional activities for the knowledge session were peer-reviewed to maximize the impact of the 90-minute knowledge session. Its aim was that the audience gain better insights on LCE and SDL approaches for promoting CBE. It included (a) knowledge that addressed the importance of CBE, LCE, and SDL in resident education and complex medical practice, (b) audience assessment and reflection activities using Grow's model (1991) on current education situations and practice challenges, and (c) audience appraisal and discussions on each of five strategic design principles, including how each approach could solve practice challenges and facilitate more self-directed, learner-driven competency development experience. The audience received two parts of the survey via email before and after the knowledge session on the five strategic principles for designing curriculums. Initially, they responded regarding their current use of the five strategic principles. At the end of the session, they responded regarding their perceived need to change their current curriculums using the five strategic principles. The majority of the respondents used their mobile devices to respond to the surveys. We matched the responses recorded on the network server using respondent contact information, log times, and device IP addresses. We only reported the responses of individuals who had agreed to participate in the study.

The control group, who did not participate in the knowledge session but were conference participants, was recruited during the same ACGME AEC conference. Using a brief enrollment form (consisting of informed consent and email), we sought voluntary respondents in person. If individuals showed interest in participating in the study during direct contact and registered an email address, we provided the online survey containing all of the questions, which include assessment items for current and desirable future practice. We did not offer an incentive or use motivational strategies to obtain responses. Survey link access was mainly made via the registered email addresses of the control respondents. We also used a quick-response code for those who could scan the barcode picture to visit the survey link using their mobile devices. To avoid any duplicate responses, we used multiple sources of information to track. Those included respondents' device IP addresses, log times, email-addresses, and the field notes that we used during the data collection of direct contact effort. While we asked respondents to forward the online survey link to colleagues in their institutions, the collection of additional data by seeking email responses subsequent to the conference was limited.

SPSS Statistics 22 (IBM Corporation, USA) was used to perform the analyses (e.g., Cronbach's alpha reliability coefficients to check the coherence of the three component scales in the survey; Spearman *rho* and point biserial correlation coefficients for the test-retest coordination of the components and items; Wilcoxon matched-pair signed rank tests to compare the current-future paired distributions of the five categorical ranks of responses provided by individual participants; Mann-Whitney *U* tests to compare the distributions of five categorical ranks between the two groups; and descriptive statistics).

Results

Respondents

The respondents were 437 GME educators and leaders from the U.S., who all attended the 2013 ACGME AEC. We compared the responses of the two groups, those who attended the knowledge session and those who did not. Of 303 individuals registered for the knowledge session, 220 participants responded to all of the survey items (73% response rate). The control group consisted of 217 individuals who did not attend the knowledge-session (81% response rate of 267 invited).

Table 1 reports similarities in the categorical distribution of respondent characteristics between a knowledge session group ($n = 220$) and a control group ($n = 217$). Chi-square tests showed no statistical differences of the comparison group distributions by specialty (surgical vs. non-surgical, $p = 0.25$), role (program vs. institutional level, $p = 0.41$), and gender (male vs. female, $p = 0.65$).

Table 1. *Respondent Distribution: Knowledge Session versus Control Group (N = 437)*

Characteristics	Categories	Knowledge Session Group ($n = 220$)	Control Group ($n = 217$)	p^a
Residency program	Surgical specialty	59 (65%)	48 (45%)	0.25
	Nonsurgical specialty	161 (49%)	169 (51%)	
Role in GME	Program Level	112 (48%)	119 (51%)	0.41
	a) Program director (PD)	101	91	
	b) Other faculty member	11	28	
	Institutional Level	108 (52%)	98 (48%)	
	a) Institutional administrator	35	33	
	b) Institutional coordinator	73	65	
Gender	Male	95 (52%)	89 (48%)	0.65
	Female	125 (49%)	128 (51%)	

Note. ^a Chi-Square test. Role in GME was analyzed by program versus institutional level.

Response reliability

A review of the survey response patterns showed internal consistency and retest reliability in the three component scales studied, as follows:

- current practice using the five educational strategies (Cronbach's $\alpha = .80$)
- desired changes in current residency programs using the five strategies (Cronbach's $\alpha = .93$)
- interest in professional development opportunities (Cronbach's $\alpha = .71$)

One month subsequent to this, we examined the validity of the self-reported responses using a repeat survey with a subgroup of study participants ($n = 32$). Based upon the test-retest result (Spearman $\rho = .98$), we ensured longitudinal consistency in the responses.

Perceived Gaps Between Observed Current Practice and Desired Innovation

The respondents ($N = 437$) indicated high rates of intention to modify their programs ($n = 398$, 91%). Intent toward curricular innovation was high, regardless of subgroup, in both knowledge session participants ($n = 200$, 92% of 220) and those who did not attend the session ($n = 195$, 90% of 217). Regarding the use of all five strategies for curricular design, the respondents ($N = 437$) noted perceived gaps between their current practice and desired changes in educational processes for resident milestone competency development (See Table 2).

Table 2. *Perceived Gaps Between Current Practice and Desired Change (N = 437)*

Strategies	Current practice ^a		Desired change ^a		p ^c
	Central tendency	Skewness (standard error)	Central tendency	Skewness (standard error)	
Offering opportunities for continuity of learning	Seldom 205 (47%)	.72 (.12)	Sometimes ^b 174 (40%)	.18 (.12)	<0.001
Assessing milestones of resident competencies	Never 246 (56%)	1.50 (.12)	Often 191 (44%)	-.11 (.12)	<0.001
Offering ongoing opportunities for reflection on milestones	Seldom 183 (42%)	.58 (.12)	Sometimes ^b 194 (44%)	.25 (.12)	<0.001
Expecting mutual accountability between faculty and resident	Seldom 216 (49%)	.80 (.12)	Sometimes ^b 181 (41%)	.24 (.12)	<0.001
Expecting team accountability for patient care	Sometimes 250 (57%)	.33 (.12)	Often 171 (39%)	-.29 (.12)	<0.001

Note.

^a Five categorical ranks of the assessed scale in ascending order: Never, Seldom, Sometimes, Often, and Always. The cell reports the central tendency of the mode (i.e., the value most often found in responses). Estimated using either the mode or the median (i.e., middle value of responses), we found no significant differences in the responses regarding current practice.

^b Regarding desired change, while the central tendency of the mode was “Sometimes,” the central tendency of the median was “Often.”

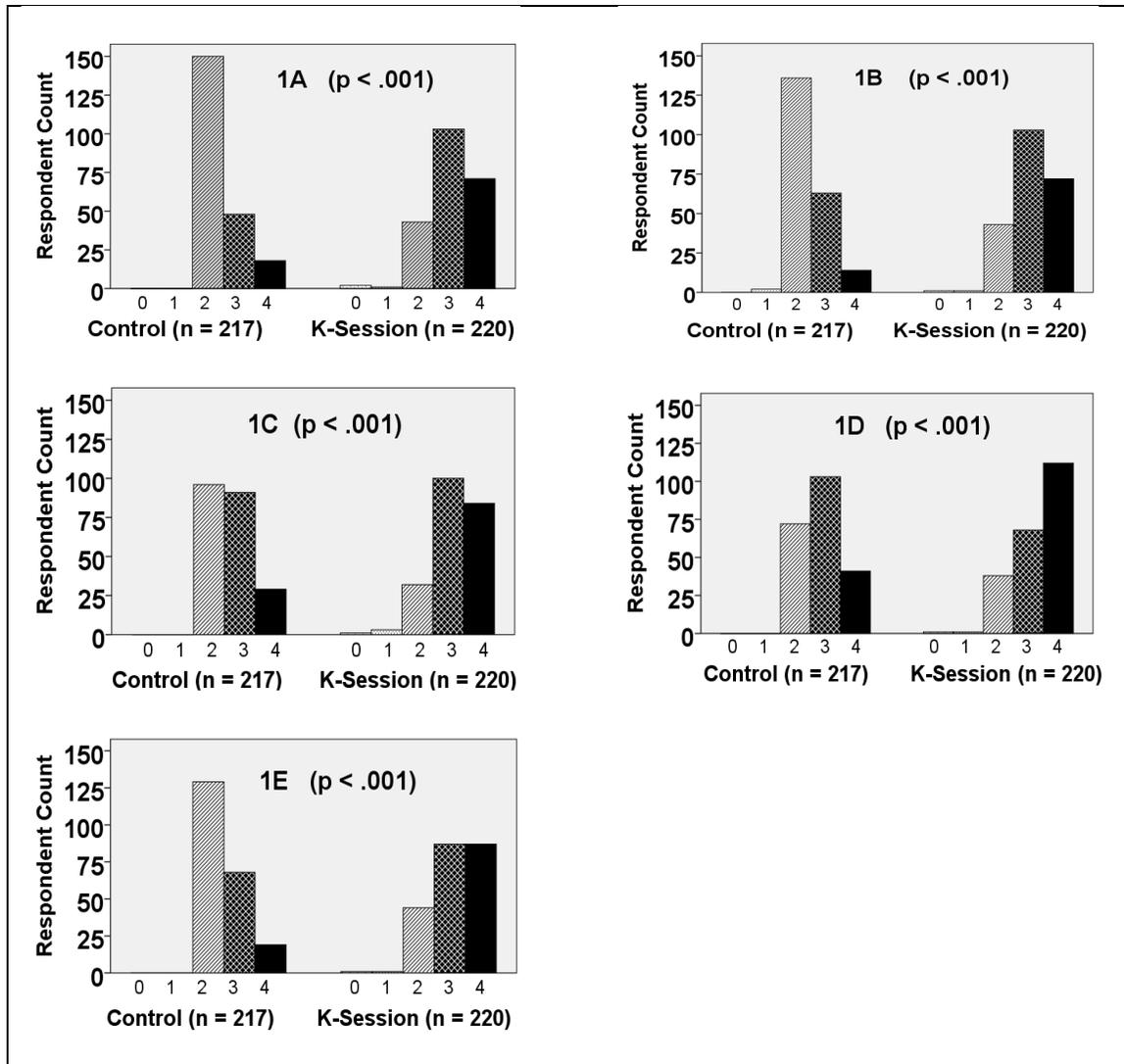
^c Wilcoxon matched-pair signed rank tests.

Greater Desire for Curricular Innovation Following a Professional Session

Regarding current practice in the use of the five strategic principles for designing curricula to promote competency development, response rank distributions did not differ significantly regardless of session participation (Mann-Whitney U test $p > 0.07$), but there were clear statistical differences between the knowledge-session ($n = 220$) and

control groups ($n = 217$) in their responses on the intent to change their current curricula.

Figure 1 illustrates differences with respect to how the groups ranked desired application of the five strategic principles. Relative to the control group, the knowledge-session group ($n = 220$) showed a stronger intent to change their residency programs in all five strategies of curricular design: Continuity of Learning ($p < 0.001$), Assessing Milestones ($p < 0.001$), Ongoing Reflection ($p < 0.001$), Faculty-Resident Mutual Accountability ($p < 0.001$), and Team Accountability ($p < 0.001$).



Note. The figure depicts Mann-Whitney U -test comparisons of the continuity of learning (1A), mutual accountability (1B), assessing milestones (1C), team accountability (1D), and ongoing reflections (1E) strategies between groups according to session participation. The histograms of the knowledge session (K-session) and control groups (Control) illustrate the scale in ascending order: Never (0), Seldom (1), Sometimes (2), Often (3), and Always (4).

Figure 1. Group differences in the ranked distribution of desired strategic applications.

The Mann-Whiney *U* test comparisons performed according to session participation revealed consistent patterns in each of the subgroup analyses. Regardless of gender, specialty, or role, the knowledge-session group showed greater willingness to change relative to the control group who did not attend the session ($p < 0.001$, 96 of 184 men; 125 of 253 women; 59 of 107 surgical programs, 161 of 330 nonsurgical programs; 112 of 231 program directors and faculty members; 108 of 206 other institutional GME administrators). There was no difference in the use of five curricular approaches in current practice between groups ($p > 0.13$).

Team Accountability More Highly Valued by the Surgical Group

Although the values of medians and modes did not differ significantly, we found some differences in the shape of the distribution of rank responses according to subgroup. Notably, the surgical group ($n = 107$) expressed significantly higher ranked sum scores relative to the nonsurgical group ($n = 330$) with respect to the current curricular design emphasis on team accountability ($Z = 2.33$; $p = 0.02$). Further, regarding change strategies, the institutional leadership group consisting of deans and their staff members in GEM offices ($n = 206$) showed significantly higher ranked sum scores, relative to the program leadership group consisting of residency program directors and faculty members ($n = 230$), in levels of desired change using all five focused curriculum strategies ($Z = 4.35$; $p < 0.001$). The majority of respondents (72%, $n = 313$) indicated a substantial interest in future professional development (i.e., Interested $n = 250$, Very Interested $n = 63$). Some reported slight interest (24%, $n = 105$), and only a small number of respondents (4%, $n = 19$) expressed no interest in further skill development.

Discussion

Accreditation agencies (ACCME, 2015; ACGME, 2013; LCME, 2015) in the continuum of U. S. medical education have expected faculty members and education leaders to provide ample opportunities for self-directed learning experience while developing physician-learners' competency as a preparation for lifelong learning [e.g., Liaison Committee on Medical Education (LCME) Standard 6. Competencies, Curricular Objectives, and Curricular Design – 6.3. Self-Directed and Life-Long Learning; Accreditation Council for Graduate Medical Education (ACGME) Common Program Requirements - IV.A.5.c. Practice-Based Learning and Improvement, & VI.A.6.f. Attention to lifelong learning]. For promoting SDL in formal education and training settings, it is important that medical educators value learner-centered curricular efforts. While the literature consistently provides rationale for key educational perspectives emphasizing individual learners' developmental processes in medical education settings (Goldstein et al., 2005; Lacasse et al, 2009; Ludmerer, 2004; Wolpaw et al., 2003), there were no empirical findings regarding the practice value among U. S. GME educators and administrators to promote resident-centered competency development processes by application of certain curricular strategies. This study's findings revealed that a majority (91–93%) of 437 GME faculty leaders and educational

administrators expressed the intent to modify their current education practices using all five curricular design strategic principles (offering opportunities for continuity of resident learning; assessing milestones of resident competencies; offering ongoing opportunities for reflection on milestones; expecting mutual accountability between faculty and resident; expecting team accountability for patient care). The findings of this study imply grassroots readiness for practice change among GME faculty and administrators, based on reported value and desire to change current residency curricula by applying the five curricular principles designed to enhance more learner-centered competency-based education.

Numerous studies in medical education suggested application of theory-based approaches to build effective models of innovation to advance medical education practices (Reznick & MacRae, 2006; Steinert, Naismith, & Mann, 2012; Swing, Clyman, Holmboe, & Williams, 2009). The growing body of the adult learning and medical education literature has articulated a common ground of emphasis on intentional and autonomous learning processes for competency-based medical education. We presented a knowledge session regarding the five focused strategic principles of curricular design to promote learner responsibility and partnership between faculty members and trainees to facilitate competency development. Changes in the survey responses suggested that the knowledge session exerted a positive influence on GME educators' and leaders' readiness to change their practice. Finding a positive outcome even after 90 minutes session was encouraging. We conjectured that our attempt to assist the audience's perceived change experience with critical reflection was useful. In particular, promoting the audience's goal-directed learning experience in professional development opportunities seemed effective with the audience. The SDL activities included in the professional development session were designed to assist the audience's understanding and engaged experience on: why they needed to gain more skills for promoting CBE, LCE, and ultimately SDL; and how the identified five strategies were relevant in contextualized practice issues. They were asked to recognize similar issues and challenges from their past and current practice, appraise the usefulness of strategic curricular design principles to promote resident development, and to propose their creative application models to solve their most urgent issues as they received immediate feedback. The positive results after the professional development opportunity support the assertion that offering faculty development opportunities is a beneficial model for audiences in graduate medical education (Dath & Iobst, 2010; Frankel et al., 2011; Steinert et al., 2012). Furthermore, we found substantial interest from the majority of respondents in future professional development. These findings suggest that professional development opportunities help engender improvements in milestone-based education practice.

Beyond the knowledge dimension, a variety of opportunities should be offered to faculty members and other leaders to enhance their skills and attributes. Potential applications for skill development opportunities implementing the five strategic principles of curricular design are as follows:

1. *Continuity of learning* (Colbert et al., 2012; Hirsh et al., 2014): Colbert et al. (2012) suggested using the clinical practice model of continuity in patient care to promote more connected experiences of learning. Residents, however, have

expressed suboptimal learning experiences at continuity clinics (Gagnon et al., 2006; Steinert et al., 2012). Further studies should be conducted to improve current understanding of specific strategies for curricular design and to optimize the benefits of such models. In addition, more faculty development opportunities are suggested for educators on how to improve longitudinal curricular schedules and resident learning experiences in order to accelerate their role in the development of their own competencies.

2. *Assessing milestones* (Bruner, 1960; Evans et al., 2014; Nasca et al., 2012; Pelgrim, et al., 2013): Predetermined indicators of milestone achievement may be useful in determining the expected competency standard achieved. Faculty members' attentive observation, coaching, and feedback can facilitate the milestone accomplishment processes of residents (Rackow et al., 2012). Therefore, we propose to offer various faculty skill development opportunities for educators that can improve effective feedback based upon the milestone competency data gathered during formative assessments.
3. *Ongoing reflection* (Holmboe, 2014; Rackow et al., 2012; Schon, 1983): To cultivate learners' developmental abilities, it is beneficial if faculty members master strategic educational skills to facilitate resident responsibility in the planning, execution, and evaluation of their planned learning goals. Faculty development opportunities should be provided to educators to strengthen their skills in offering effective reflective activities for residents.
4. *Faculty-resident mutual accountability* (Balmer et al., 2012; Goldstein et al., 2005): According to an ethnographic field study conducted by Balmer et al. (2012), attending physicians and senior residents may understand their mutual responsibilities without being bound by them. Training sessions that demonstrate collaborative skills could be beneficial with respect to enhancing the mutual responsibility of faculty members and residents who would form partnerships. We propose faculty development opportunities to develop the partnership skills with residents.
5. *Team accountability in patient care* (Baker et al., 2005; Dedy et al., 2013): While teamwork and safety training are essential in patient care, the concept of team accountability across all workplace units may be unclear. Professional development sessions for faculty and staff to clarify expectations regarding team responsibilities and to establish team-based reward systems could help to reduce the unexpected negative culture of individual-based competition. Enhancing teamwork communication skills in multidisciplinary-care teams is an excellent example of the application of such team accountability.

As healthcare systems become more complex with growing emphasis on the coordination of care, the development of highly functioning teams is an increasingly important goal in education and professional training. Our subgroup analysis suggests that surgical educators currently place greater value on team accountability as a strategic design principle for curricular activities (Manser, 2009; Melck, Weber, & Sidhu, 2007), relative to GME practitioners from nonsurgical specialties ($Z = 2.33$; $p = 0.02$). This finding implies that surgical education leaders and administrators may be in

a demanding place where they could play an important leading role in GME innovations emphasizing multi- and inter-disciplinary collaborations.

When we compared responses according to the roles of GME practitioners, we found that the institutional leadership group expressed higher intent toward curricular changes using all five strategic principles relative to the program leadership group ($p < 0.001$). To state this differently, the institutional leadership group was more conscious of leading curricular changes to fulfill their institutional responsibilities and the current demands of milestone-based education accreditation. This finding suggests that program leaders of residency programs may require more support in developing their abilities as program directors and faculty members with respect to strengthening perspectives, knowledge, skills, and attributes in milestone-based education. Under the current constraints of the academic environment, there might be a difference in the opportunities offered with respect to professional development and networks between institutional GME leaders and residency program leaders. Offering inclusive opportunities to all members is helpful.

Although we cannot project the impact the NAS policy may have on community culture and behaviors, either positively or negatively, the results of this study imply that there were positive beliefs and attitudes demonstrated in U. S. GME educators with respect to curricular innovation, using strategies suggested for promoting more learner-centered education toward SDL. Further research is required to elucidate the relationship between educators' values and strategic perspectives underlying accreditation policies. For example, one might test a hypothesis that GME educators and leaders who value more developmental teaching strategies would demonstrate less resistance to milestone-based accreditation policies. Such studies could offer insights into whether NAS accreditation requirements and educators' efforts are compatible for promoting CBE.

GME innovations should address multidimensional issues, which include the heterogeneity of curriculum standards across different training programs (Cooke et al., 2010; Diethrich, 2012; Sachdeva et al., 2007), the lack of performance-based assessments using validated tools and reliable approaches (Cooke et al., 2010; Kogan, Conforti, & Iobst, 2014), the need to join and potentially lead a team of multidisciplinary collaborators, and the aspirations of developing residents' competency beyond technical skills for the pursuit of self-directed, lifelong learning (Bell, 2009; Diethrich, 2012). While GME implements specifically defined assessment levels of the Milestones to detect sequentially assumed developmental status as evidence of educational achievement (Beeson et al, 2015), it does not assess educators' curricular approaches for promoting resident competency acquisition. For future study, we recommend development of assessment tools by refining each of five strategic design principles across different educational settings (such as in- or outpatient clinics; classroom or online; simulation or clinic service), cultures (U. S. or other regional education systems), and residency year (e.g. novice or experienced time). Clinician-educators could use such assessment tools as guiding checklists for assuring resident-centered circular activities across different training time and settings.

According to findings from studies of behavioral change processes, the manner in which individuals perceive their beliefs regarding affiliated groups and social

pressures influences their intention regarding whether to engage in action (i.e., subjected norm) (Ajzen, 1991; Hale et al., 2002). These findings suggest that GME educators and leaders would be more likely to pursue educational innovation when they perceive widespread acceptance of it within the community of practice. We found that 437 GME leaders perceived value in the use of the five strategies of curricular design suggested for promoting developmental process-oriented teaching efforts. We hope that these findings can contribute to a broader discussion among surgical educators regarding curricular innovation and residency reform strategies to advance the quality of current practice in GME.

Limitations of the Study

Some limitations should be considered in interpreting the findings of this study. A convenience sample was used, which precludes generalizability of the findings to all GME settings. The 437 voluntary respondents may have been self-selected by virtue of their attendance at the ACGME AEC. This sample of individuals may be more motivated to modify their programs relative to the wider population of GME faculty members. We believe that it is reasonable, however, to assume the ACGME AEC attendees have been representative practitioners in the U. S. GME. Many segments of the population could participate in professional development sessions to learn about strategies to promote competency-based education, particularly prior to implementation of the NAS. Despite the sample limitations, the study results still offer evidence that some medical educators and leaders do value strategies for learner-centered practice.

This study invited volunteer respondents who were able to respond to online surveys using network mobile devices. Although we did not meet respondents who were unable to use such devices at the conference, the requirement for skills in the use of technology in other samples may introduce selection bias. This study presents self-reported observations regarding the practice of the five strategic principles in a sample of GME educators and leaders. Responses relied upon respondents' comprehension of these strategic principles. Despite the limitations, we implemented multiple assurance processes during the development of survey items and found 97% agreement between intended and actual interpretation of each survey item. In addition, the test-retest analysis of this self-reported survey indicated stable responses by individual respondents across different times and settings. Subsequent interviews with the respondents added to the validity of the responses, as they allowed us to ensure high levels of comprehension of the survey items across different times and settings (Groves et al., 2004).

Conclusions

Among U. S. GME educators and leaders, there are perceived gaps in the application of the five strategic principles of curricular design to facilitate the learner-centered developmental processes involved in resident competency. Offering carefully structured opportunities for professional development appears to be beneficial in influencing the

attitude and intent of educational leaders to undertake innovation endeavors in GME, finding effective ways to promote the use of strategies that build skills for lifelong, self-directed learning.

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TRACKING PATHWAYS TO SUCCESS: TRIANGULATING LEARNING SUCCESS FACTORS

Naomi R. Boyer and Peter Usinger

This cross-sectional study identifies pervasive barriers to improvements in self-directed learning across academic domains and delivery mechanisms that are promoted by both students' individual learning strategies and faculty's teaching practices. As continuing research, the current investigation explores the relationships between student and course level/characteristics, course levels, delivery models, and the Motivated Strategies for Learning Questionnaire-Shortened (MSLQ-S). In addition, a predictive model that identifies strategies for course success/completion rates is described, which can serve as a framework for further research and as an essential tool to evaluate the impact of curricular redesign activities. The study also indicates higher education intervention opportunities in order to overcome barriers to student success.

Keywords: self-directed learning, undergraduate education, MSLQ, success strategies for college, predictive model for student success

The open access opportunity for students to attend Community/State College experiences provides a gateway for many who otherwise would not have the option, due to financial constraints, previous academic success, or life conditions, to participate in higher education. Perhaps tied to the limitations that may have restricted post-secondary enrollment options or linked to other variables, successful retention and completion of two- and four-years degree students remains a national concern. The rate of program completion within a traditional timeframe for community college students is close to 50% (Goldrick-Rab, 2010). Course completion rates vary based upon subject matter and other variables and supporting students through the various course delivery, content areas, and educational levels (college credit versus developmental) is necessary (Ashby, Sadara, & McNary, 2011).

Learning Process and Delivery

Engagement and active learning have been found to be linked to greater academic performance and course or program completion with engagement being demonstrated as the outward manifestation of a motivated student (Chaplin, 2009; Connell & Wellborn, 1991; Freeman, et al., 2007; Hake, 1998; Knight & Wood, 2005; Michael, 2006; Skinner, Kindermann, & Furrer, 2009). Active learning has been indicated to include engagement and relate to both cognitive and physical or behavioral

actions that involve the learner in the learning process (Chen, Nurkhamid, Wang, Yang, & Chao, 2014). According to McClenney, Marti, and Adkins (2012):

The findings from 20 years of research on undergraduate education have been unequivocal: The more actively engaged students are — with college faculty and staff, with other students, and with the subject matter they study — the more likely they are to learn, to stick with their studies, and to attain their academic goals (p. 1).

Active, engaged learning creates experiences through which students can overcome academic barriers. Compliance should not be mistaken for engagement, as quiet acceptance of assigned tasks in learning does not equate to active involvement in the learning process (Jackson & Zmuda, 2014).

Personal characteristics (e.g., experience, judgment, and previous education) along with content relevance, application of learning, intrinsic motivation, and social elements combined with the inherent psychological need to self-direct through learning processes are a foundation for lifelong learning (Ponticell & Zapeda, 2004). Facilitating engaged and active learning in college environments is hypothesized by the authors to lead to a reduction in compliant, passive behaviors and expand critical thinking, outcomes which can be linked to greater success in learning and ultimately to workplace success.

Martin, Spolander, Ali, and Maas (2014) contend that the “culture of compliance and the technocratic approach to task completion” (p. 200) that is found in specific workplace settings and we would contend is supported by traditional didactic teaching methods is in opposition to the desire to create critical thinking and “deep learning.” In response to this, current trends in post-secondary instructional practice have further exacerbated the need for the adult learner to move beyond passive, compliant learning to an engaged, active, and self-directed approach. Online learning, the flipped classroom, and competency-based instructional models can be seen as examples of instructional design, methods, and delivery that require learner motivation, efficacy, and engagement.

Substantive research on online learning has linked success in online environments to self-directed learning behaviors, technological skill, self-regulation, collaborative behaviors, self-motivation, and autonomy (Guglielmino & Guglielmino, 2002; Harrell & Bower, 2011; Ho, Kuo & Lin, 2009; Jagers & Bailey, 2010; Moore, 1987; Nash, 2005; Yukselturk & Bulut, 2007). The impact of the online environment on course completion appears to have been substantial, with a 10-20% increase in withdraw and failure in online courses (Angelino, Williams, & Navig, 2007; Doherty, 2006; Herbert, 2006).

More recent research on flipped classroom models provides additional documentation supporting student self-systems and patterns of action that facilitate efficacious and autonomous involvement in the learning process. The flipped instructional model can be defined as the delivery of direct instruction outside of classroom time and space, usually through the use of technology, and the integration of hands-on, collaborative, active learning with support, differentiated learning, and guided assistance within the face-to-face environment (Hamdan, McKnight, McKnight

& Arfstrom, 2013). The flipped model shifts the student from being the “product of teaching to the center of learning” by establishing an environment that requires active involvement in learning and assessment as is noted by Hamdan et al., (2013) and has been noted to increase student engagement, strengthen team-based skills, give students more control, and promote student-centered learning (Acedo, 2013; Millard, 2012).

Based upon an overview of the current literature and similar to success factors within the online learning environment, it is posited that the following improved student skills are required for success within the emergent flipped classroom model: (a) critical thinking, problem solving, and higher order thinking, (b) student participation, engagement, and motivation, (c) ability to work in a team-based approach and collaborate via peer-to-peer networks, (d) maximization of personalized, customized, and differentiated learning, and (e) ability to function in a student-centered learning environment with control and ownership of the learning process.

While competency-based education (CBE) is not a new concept, integrating competency, mastery, and open-entry/open-exit models are innovative when linked to higher education degrees and credentials. Replacing the credit hour with the accomplishment of competencies is generating interest nationally as a mechanism for transforming the traditional classroom environment through models that are geared toward the non-traditional, working student to reduce time to degree completion, reduce cost, and encourage student success, with the instructor as a coach/mentor via differentiated support (Book, 2014; Klein-Collins & Baylor, 2013; Shubilla & Sturgis, 2012; Weise, 2014).

Interestingly, in CBE delivery and program design, which is supported as transformational by EDUCAUSE Next Generation Learning, the Lumina Foundation, and the Center for America Progress, many of the same student skills are required for success (Klein-Collins & Baylor, 2013; Lumina Foundation, 2014; Weise, 2014) as in online environments and the flipped classroom. Given the relatively early stages of the use of competency-based degree options, the integration of peer collaboration and team-based product development has not yet been fully conceived; however, peer interactions have been noted as important to students in these programs (Klein-Collins & Baylor, 2013). The need for adult learners to embrace and demonstrate self-direction appears to be more critical in today’s workplace and learning environments than ever before.

Self-directed Learning

Self-direction is a complex concept with a variety of aspects and associated constructs. In practice, self-direction involves shifting the responsibility for the learning activity from an external source such as teacher to the individual learner, with the learner assuming some level of control and active engagement with the learning process. Perceived academic control has been found to be a predictor of a “learners’ engagement and performance” according to Won You and Kang (2014, p. 132). Whether this takes the form of behavioral activities such as planning objectives, identifying resources, setting timelines, developing products, authenticating learning, personal reflection, or through the process of discovery and exploration, the learner becomes central to knowledge acquisition within a self-directed environment (formal or informal).

A number of factors have been identified as contributing to self-direction. Stockdale and Brockett (2011) identified initiative, control, self-efficacy, and motivation as part of her instrument, the Personal Responsibility Orientation to Self-Direction in Learning (PRO-SDLS), as contributing to self-direction. Others have included level of autonomy, self-regulation, time management, self-control, person and social responsibility as factors relating to self-direction (Li, Wright, Rukavina, & Pickering, 2008; Pajares, 2002). In addition, the Self-Directed Learning Readiness Scale includes the constructs of love of learning, self-concept as an effective independent learner, beneficial process, initiative in learning, self-understanding, and acceptance of responsibility for one's own learning (McCune, Guglielmino, & Garcia, 1990).

Autonomy, as measured by the Learner Autonomy Profile includes the four factors of: desire to learn, learner resourcefulness, learner initiative, and learner persistence (Confessore, 1992; Confessore & Park, 2004). Ponton and Carr (2000) describe learner autonomy and its benefits toward lifelong and self-directed learning through the conative elements of initiative, resourcefulness and persistence. Self-efficacy has been identified as having a role in autonomous learning and self-direction and has also been found to tie directly to student success (Ponton, Derrick, Confessore & Rhea, 2005).

Purpose

Student success and completion in higher education courses is an ongoing concern noted throughout the learning literature and becomes more relevant with the growth of online enrollment and the trend to eliminate developmental education. Furthermore, community college students often require additional scaffolding to introduce them to the required roles and strategies that facilitate success (Karp & Bork, 2012), and traditional instructional strategies are more likely to reinforce passive and compliant learning behaviors vs. actively engaged and self-directed involvement in the learning process (Jackson & Zmuda, 2014).

To help students succeed, it is critical to identify what factors are inhibiting success. The purpose of this paper is to investigate the constructs that impact course success. It is hypothesized that constructs linked to higher levels of self-directed behaviors and characteristics (i.e., intrinsic goal orientation, control beliefs about learning, self-efficacy for learning and performance, meta-cognitive self-regulation, effort regulation, and help seeking) will correlate with student success and course completion. The intention of this study is to identify:

1. What relationships (correlations) exist among selected instrument (MSLQ-S) constructs, and how robust are these relationships across different sets of student characteristics (e.g., demographics), course characteristics (e.g., Math vs. English), course levels (developmental vs. college credit) and delivery formats?
2. What predictive models (via multivariate regression analysis) can be established (if any) that are able to explain how self-systems and patterns of actions can be leveraged through course-based strategies and curricular design changes to result in improved course success/completion rates or targeted learning outcomes (and perhaps to higher college success)?

While this particular article is focused on the questions noted above, previous research and presentation provided findings relevant to associated preliminary research questions (Boyer & Usinger, 2012; Usinger & Boyer, 2014). This continuation study includes a sufficiently large sample population to be able to adequately address the questions relating to relationships and hypothesis of a predictive model, which was not possible in preliminary publications.

Research Procedures

This article reports on the third phase of a three-part study. The initial two phases of the study provided preliminary information about the constructs and correlations associated with the Motivated Strategies for Learning Questionnaire-Shortened (MSLQ-S) instrument and the context-based sensitivities of the measures across course delivery types, student characteristics, disciplines, and course levels (developmental versus credit-based). This third research piece supports the College's strategic planning efforts to improve student success in all courses, but more particularly in online and developmental courses, to provide more tailored support mechanisms to the College's diverse student population, and to respond to the workforce skills required for success in the labor market.

Sample

The described study was conducted within the context of a four-year public Florida community/state college, teaching institution, with a mission of access, low-cost instruction, development of talent to support local workforce needs, and AA, AS, and Baccalaureate degree completion. The institution had a total enrollment of 16,766 credit-based students for the 2013-14 academic year.

The study sample was drawn from students enrolled in 128 courses covering the following areas of curriculum: Developmental Math, Reading, and Writing; Student Success; Mathematics and Statistics; English and Letters; Natural Sciences; Social Sciences; Humanities; Fine Arts; and Nursing. Emails were sent to greater than 29,400 students with instructions and a link to complete the instrument. A follow up email was sent to students approximately two weeks later.

In total 3,178 students (a blend of approximately 35% part-time and 65% part-time students, depending on term) completed the inventory, representing a response rate of 11%. Since only 129 respondents attended hybrid classes and only 71 students were enrolled in workforce development courses with varying course contents, those were excluded from the detail analyses to focus the comparison on the traditional and more representative course environment. The sample generally matched the College population with 14.3% Hispanic, with an average age of 30, which roughly matches the general student population at the College.

The distribution of responses across academic areas and the number of associated sections is shown in Table 1 below, with the number of courses in each area are noted in parenthesis next to each academic area.

Table 1. *Participation Across Academic Areas*

Academic Area (# of Courses)	Traditional Delivery Format		Online Delivery Format	
	# of Sections	# of Students	# of Sections	# of Students
Humanities (11)	56	74	26	43
Letters (30)	336	524	88	153
Math (15)	506	1047	53	100
Nursing (16)	72	171	26	48
Sciences (34)	222	373	51	95
Social Sciences (22)	127	230	75	120
Total (128)	1319	2419	319	559

A slightly shortened version of the MSLQ-S by Pintrich and DeGroot (1990) was administered over four terms, Fall 2011-Fall 2013, to a self-selected set of undergraduate students enrolled in college-level and developmental education courses. The original selection criteria for Fall 2011 courses involved a multi-year review of online course success rates, flagging those courses for participation in the study that had shown consistently high failure and withdrawal rates, and typically registered students in more than one section per term. For the subsequent survey administrations this selection was expanded with a set of typical Associate of Arts (AA) and selected Associate of Science (AS) courses, to produce a more representative course spectrum. It is noteworthy that mean value differences for individual survey items or MSLQ-S scales between measurements were extremely marginal and statistically insignificant.

Instrumentation

The theoretical model used as a basis for this research incorporates student characteristics, context, self-systems such as motivation and beliefs, and patterns of action, which are proposed to impact academic performance. This model has been adapted from the work of Connell, Halpern-Flesher, Clifford, Crichlow, and Usinger (1995) and incorporates elements of self-direction through both self-systems (self-efficacy, control of learning beliefs, and intrinsic goal orientation) and patterns of action (meta-cognitive self-regulation, time/study environmental management, effort regulation). The MSLQ-S was administered to capture the model components of motivation, beliefs, and patterns of action.

The original MSLQ with 81 questions was developed and validated between the years of 1986-1988 (Garcia & Pintrich, 1995) and revised with a shortened version in 1990 (Pintrich & DeGroot). The instrument has been used with learners of a variety of ages (Lui et al., 2012; Matuga, 2009; Pintrich, Smith, Garcia, & McKeachie, 1991, 1993) and within a variety of disciplines and participant demographic characteristics (Gasco, Vallarroel, & Goñi, 2014; Rotgans & Schmidt, 2012; Salamonson, Everett, Koch, Wilson, & Davidson, 2009). The MSLQ-S, the instrument selected for this study, has a number of scales that align to the general concept of self-direction and self-regulation of learning and covers many of the aforementioned constructs. In addition, the MSLQ-S had become a formative assessment tool of choice for a number of faculty

teaching Student Learning Success and Developmental Math courses to facilitate their support for student learning behaviors that lead to higher academic success rates.

The MSLQ-S was the primary tool for gaining information about the students' value, expectancy, and affect for learning (Pintrich et al., 1991). The instrument includes a motivation section and learning strategies section. The motivation section assesses students' "goals and value beliefs for a course, their beliefs about their skill to succeed in a course, and their anxiety about tests in a course" (Pintrich et al., 1991, p. 3). The learning strategies section includes cognitive and metacognitive strategies and student management of different resources (Pintrich et al., 1991). These MSLQ-S sections feature the following constructs: motivation scales--intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, test anxiety; and learning strategies scales--rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment management, effort regulation, peer learning, and help seeking (Duncan & McKeachie, 2005).

While all MSLQ-S scales were utilized to relate to the behaviors of self-direction across courses, some of those that in previous research and our pilot study with selected student-success courses did not display significant correlations with course success had been considerably shortened to reduce the time students needed to complete the questionnaire (Usinger & Boyer, 2014). While the instrument's primary focus is motivation and learning strategies, a number of the integrated constructs can provide information about self-directed behaviors and then be utilized to consider issues relating to student success and retention in online courses.

Of the 15 scales of the MSLQ-S, five constructs were included completely, five almost completely, and five constructs represented partially, leading to a total number of 61 out of the original 81 questions (excluding demographic items) included in the instrument. Additional detail is available in Appendix A. This count already reflects the post-hoc exclusion of one item from the Time/Study Environment Management scale ("I attend class regularly.") since it showed almost no variance and was not really applicable to the online learning environment in the given form. The instrument took approximately 15 minutes to complete.

Data Collection

The questionnaire was administered as an online survey via an e-mail invitation link sent to students enrolled in all three delivery types of these courses: distance learning, hybrid/blended, and face-to-face formats. Participation was voluntary and did lead to a slight self-selection bias, which will be addressed later in the limitations section of this article.

Data Analysis

Based on a general model of motivational and self-system processes and the demonstrated differential impact of these processes on educational success, ordinary least squares path analyses (Connell, 1990; Connell et al., 1995) provided a multivariate and multi-dimensional model to describe cause-effect relationships between key MSLQ

constructs and student learning outcomes within and across the academic disciplines involved in the study.

In the process, the researchers re-aggregated the MSLQ-S into a chain of constructs that can effectively predict a significant portion of self-directed learning success for different student populations. These final elements were presented, but not accomplished in the previously presented paper on this topic.

For reliability and validity controls, exploratory and confirmatory factor analyses were conducted to ensure the revised instruments' comparability with the original scales. In addition, inter-scale correlations and construct correlations (both using Pearson's r) with academic variables paralleled earlier research findings (Boyer & Usinger, 2015). Finally, the results from the ordinary least squares path analyses using a multivariate regression model established the predictive performance pathways discussed in the following sections of this paper. All analyses were executed with the Statistical Analysis System (SAS), release 9.3.

Major Findings and Conclusions

Overall, and as indicated by the comparative Cronbach's alpha values (Appendix A), the MSLQ-S constructs in this study showed the same robust reliability and replicable factorial patterns that validated the original scale design (Duncan & McKeachie, 2005; Pintrich, 1991). Similarly, zero-order correlations between the different motivational and cognitive scales replicate the MSLQ-S auto-correlation patterns established by the same studies or subsequent reviews (Boyer & Usinger, 2015).

However, while these findings confirmed instrument reliability and validity (Boyer & Usinger, 2012), additional exploratory factor analyses within the larger sample helped identify several scales with co-linearity and cross-loading factorial patterns among a variety of instrument items, which assisted with an aggregation of the original constructs in a way that largely eliminated undesired co-linearity, improved reliability coefficients, and was leading to a more simplified pathway model for the purpose of this study.

The new constructs combine into three motivational scales supplying the *Self-System* components of the pathway analysis (Motivational Strengths, Control & Self-Efficacy Beliefs, and Test Anxiety), and four scales depicting learning strategies (Study Behaviors, Cognitive Engagement, Effort Management, and Support Outreach) for the more behavioral *Patterns of Action* components of the pathway model. The inter-scale correlations for both sets are shown in Table 2, largely showing the expected and largely significant relationships among the new constructs.

Perhaps the most interesting findings here are the lack of any meaningful correlation between Motivational Strengths and Test Anxiety, as well as the positive correlations between Test Anxiety and three of the behavioral constructs. In summary, it appears that motivational strength is not having a moderating influence on test anxiety, while higher test anxiety is associated with increases in study behaviors, learning-related cognitive engagement, and more outreach for learning support. The table also indicates that students with lower self-efficacy and less effective effort management experience higher test anxiety. While these findings are consistent with

previous research, the extent of these relationships is substantiated by the corresponding predictive pathways of the multivariate analysis.

Table 2: *MSLQ-S Inter-Scale Correlations After Re-Aggregation of Constructs*

MSLQ-S Inter Scale Correlations	Motivational Strengths <i>r</i>	Control & Self-Efficacy Beliefs <i>r</i>	Test Anxiety <i>r</i>	Study Behaviors <i>R</i>	Cognitive Engagement <i>r</i>	Effort Management <i>R</i>
Control & Self-Efficacy Beliefs	0.67***					
Test Anxiety	0.03	-0.21***				
Study Behaviors	0.48***	0.27***	0.20***			
Cognitive Engagement	0.54***	0.33***	0.19***	0.74** *		
Effort Management	0.37***	0.31***	-0.10***	0.51** *	0.40***	
Support Outreach	0.28***	0.13***	0.15***	0.39** *	0.46***	0.09***

Note: $N = 2,976$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Course Performance and Course Characteristics

The next portion of the data analysis provided interesting insights into the relationships between the motivational factors and learning strategies on one side and accomplished course outcomes on the other. Table 3 displays the correlations between the respective MSLQ-S scales and course performance (Grades: F/W = 0; C /D = 1; A/B = 2) and largely replicates the findings from the original analysis with the original/disaggregated MSLQ-S scales (Boyer & Usinger, 2012). These levels of individual course performance (0, 1, or 2) are used to calculate mean performance scores for subgroups.

While motivational constructs show correlation patterns similar to previous research, the behavioral scales associated with learning strategies show only fragmented and weak relationships with grades or successful course completion. Motivational strengths, control and self-efficacy beliefs, and test anxiety have traditionally been the most powerful factors of academic success and the study data support those findings to a large degree. However, the absence of any significant relationship between course outcomes and cognitive engagement combined with the fact that our student sample's learning strategies relied mostly on effort management as relevant success factors, might directly point to the challenges experienced by a mostly underprepared sample of students at the onset of their postsecondary career aspirations.

Comparing those correlations between course delivery formats (online vs. face-to-face) and course level (college preparatory vs. college level) shows very consistent patterns. The only noteworthy differences reside in the more significant role study behaviors and effort management play for course performance in online and developmental course environments. But across delivery formats and course level, the key drivers for success are certainly on the motivational side of things, assisted by more and better effort management. These findings will be further discussed in the analysis of the predictive pathways for those areas.

Table 3. *Correlations Between MSLQ-S Scales, Course Outcomes, Delivery Method, and Course Level*

	All (n = 2,978) <i>r</i>	Online (n = 558) <i>r</i>	Face to Face (n = 2418) <i>r</i>	College Prep (n = 774) <i>r</i>	College Level (n = 2202) <i>r</i>
Motivational Strengths	0.21***	0.17***	0.22***	0.25***	0.19***
Control & Self-Efficacy Beliefs	0.41***	0.35***	0.42***	0.43***	0.39***
Test Anxiety	-0.20***	-0.17***	-0.21***	-0.23***	-0.18***
Study Behaviors	0.04*	0.04*	0.04	0.08*	0.04
Cognitive Engagement	0.04*	0.03	0.04	0.07	0.04
Effort Management	0.19***	0.24***	0.18***	0.25***	0.19***
Support Outreach	-0.02	-0.04	0.00	0.01	-0.02

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

About 26% of the students participating in this study were enrolled in developmental education or intermediate math courses (combined under College Prep) when completing the MSLQ-S, and over 70% were part-time students. It is worth noting that a number of the students may have required developmental education prior to the study initiation. A major body of research by the Community College Research Center (CCRC) points to the lack of successful learning strategies, particularly for underprepared, first-time, and part-time community college students, as a key contributor to student course failures, while also adding significant time to degree completions (Wachen, Jenkins, Belfield, & Van Noy, 2012; Xu & Jaggars, 2014).

During the administration of the instrumentation, about 85% of the College's first time in college (FTIC) enrollment was not college ready in all core placement areas. The results speak for a strong need to advance the teaching of successful learning strategies into the First-Year curriculum and the associated learning support environments. The absence of meaningful correlations between course outcomes and critical thinking, metacognition, peer collaboration, and help-seeking, which are embedded in the Cognitive Engagement and Support Outreach constructs shown, must also raise concerns about the effectiveness and quality of current curricular designs.

Discipline-Based Beliefs and Strategies

Another question raised concerned the variations in self-directed learning and meta-cognitive success strategies that exist within courses of the same subject domain and across different disciplines, and to what extent are these variations confounded with particular course delivery formats. The academic-area-specific correlations shown in Table 4 establish baseline correlations between MSLQ-S constructs and course performance outcomes pertinent to each area.

Table 4. *Correlations between MSLQ-S Constructs and Course Outcomes by Academic Area*

	Humanities (n=117) <i>r</i>	Letters (n=676) <i>r</i>	Math (n=1,147) <i>r</i>	Nursing (n=219) <i>r</i>	Sciences (n=467) <i>r</i>	Social Sciences (n=350) <i>r</i>
Motivational Strengths	0.17	0.08*	0.25***	0.23***	0.05	0.16**
Control & Self-Efficacy Beliefs	0.29**	0.23***	0.46***	0.51***	0.38***	0.24***
Test Anxiety	-0.18*	-0.06	-0.27***	-0.16*	-0.21***	-0.06
Study Behaviors	-0.01	0.03	0.02	0.06	-0.05	0.20***
Cognitive Engagement	-0.01	-0.01	0.03	0.09	-0.05	0.13*
Effort Management	0.12	0.19***	0.22***	0.27***	0.11*	0.31***
Support Outreach	-0.12	-0.03	0.02	-0.05	-0.10	0.08

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

While several sub-samples were too small to effectively compare the data across course delivery formats and certainly affect the statistical comparability of the significance levels associated with the correlations presented, the data demonstrate a level of instrument sensitivity to the specificities of the various disciplines and substantiate the earlier discussed pervasive lack of correlations between key behavioral constructs and course outcomes for most academic areas. With regard to meaningful correlations, only the social sciences courses in our sample seem to provide the engaging academic environment where course performance is significantly influenced by study behaviors and cognitive engagement. The only additional noteworthy findings are certain mean level differences.

In our sample, students enrolled in humanities and social sciences courses showed significantly lower mean levels in support outreach and test-anxiety than their peers. Both subgroups also presented, on average, higher course performance scores (1.64-1.65) and based on the previously hypothesized relationship between test anxiety and support outreach this could imply lower course difficulty in these subject areas, which in return would lead to less anxiety and perceived need for support.

On the other hand, math, with the lowest average performance score (1.17) showed also the lowest mean values in motivational strengths, control and self-efficacy beliefs, and cognitive engagement, while the nursing sub-group (with an average performance score of 1.60) showed the highest mean levels in motivational strengths, study behaviors, effort management, and support outreach. To some degree the discipline-specific data for math and sciences courses also captures the challenges science, technology, engineering, and math (STEM) programs at community colleges face: a large degree of under-preparedness for these disciplines, combined with motivational challenges, lower control and self-efficacy, and a higher negative impact of test-anxiety, is not accompanied by learning strategies that would be able to offset these challenges. As a result, average course failure rates are higher than for other areas.

Predictive Modeling of Course Success Factors

As indicated earlier, the need for a clear understanding of student success factors when it comes to instructional and general academic support, specifically online, triggered this research study. The absence of any significant correlation between Metacognitive Self-Regulation and most other Learning Strategies-related factors on one hand and course-level outcomes on the other, certainly emphasizes the fact that underprepared high-school students do not just transform magically into a postsecondary success story, but need the college's environment and support to help them gain the necessary skills to master the challenges they face. In short, they have to learn to work smarter, in addition to working harder.

This becomes even more obvious when all MSLQ-S constructs are assembled to carry out a multivariate regression analysis to assess the combined impact of motivational factors and learning strategies on course outcomes achieved by participating students across all academic disciplines involved in this study. The results of this predictive model are shown in Table 5 and indicate that only two of the MSLQ-S constructs have a significant positive impact on course performance across all models: Control & Self-Efficacy Beliefs and Effort Management, with the self-efficacy sub-construct clearly dominating the predictive model, which explains about 20% of course performance outcomes (Adjusted R-Square). In this context, test anxiety and cognitive engagement show about the same negative impact on course outcomes, with minor significance variations across models.

Table 5. *Multivariate Regression Analyses: Predictive Models*

	All Courses	Face-to-Face	Online	College Prep	College Level
F Value	98.18***	82.78***	14.53***	29.57***	68.16***
R-Square	0.200	0.207	0.164	0.232	0.188
Standardized Beta Coefficients					
Motivational Strengths	-0.05	-0.04	-0.09	-0.05	-0.07*
Ctrl. & Self-Eff. Beliefs	0.43***	0.44***	0.37***	0.44***	0.43***
Test Anxiety	-0.07***	-0.08***	-0.05	-0.08*	-0.05*
Study Behaviors	-0.04	-0.03	-0.05	-0.02	-0.05
Cognitive Engagement	-0.08**	-0.09**	-0.06	-0.05	-0.08*
Effort Management	0.12***	0.11***	0.18***	0.15***	0.12***
Support Outreach	-0.01	0.00	0.02	-0.03	0.01
<i>N</i>	2,976	2,418	558	774	2,202

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

These findings not only support the various concerns about the missing positive impact of key learning strategies indicated earlier, they raise them to another level. We know from the correlation analyses that motivational and cognitive constructs display in general positive correlations with course outcomes. However, the results of the predictive model indicate that students with high control/self-efficacy beliefs and effort management that display somewhat lower levels of motivation and cognitive

engagement achieve better course outcomes than their more motivated and cognitively engaged peers.

Given that students' course outcomes are mainly affected by their confidence in being able to master course requirements and the ability to consistently manage their learning environment through learning behaviors, one would expect the effective use of *higher order* learning strategies. This appears to not be the case; rather the data suggest the opposite, which does not support what is known about best practices in learning models within higher education today. It appears that students are producing positive course outcomes without utilizing these learning strategies for their course success. We can assume that interventions in both student engagement and faculty development will need to work hand in hand in order to overcome the dilemma reflected in these findings.

If students are exposed to replication of an educational environment where previous patterns of learning are never exposed to the challenges of continuous change, how can a coherent response to the changes already manifested or underway be expected? In other terms, if students are not enabled to develop, advance, and nurture the critical thinking and meta-cognitive reflection abilities currently missing, then higher education is failing the intended mission. We are setting them up to climb a mountain without the tools to master the challenges of steeper learning curves in more complex subjects and workplace environments.

The results shown in Table 5 also add a crucial question to the review of existing learner support mechanisms: Is it possible that our instructional focus is more reflective of compliance than of discovery needs? It would explain why the analysis shows a significant, but negative relationship between cognitive engagement and course outcomes in college level courses and face-to-face classes. In short: Students who just follow the script will get rewarded; students who question the script are somewhat more likely to fail.

Furthermore, while this might reflect a general absence of some underlying and more advanced learning concepts, it might also indicate that some faculty cultivate students who are successful as compliant learners rather than encourage and reward the questioning of "why" a concept or principle is correct. Lower scores on questions such as "I often find myself questioning things I hear or read in this course to decide if I find them convincing" and "I treat the course material as a starting point and try to develop my own ideas about it" coupled with the student course success suggest that these learners are not developing the workforce-required critical analysis skills. It might also be a pre-cursor for many student's struggle to complete more demanding academic challenges (i.e., advanced STEM courses) at a later point in time.

Students in face-to-face and college-level courses who scored lower on questions that asked about cognitive engagement strategies were more successful in their course completions. Sample questions include: "When I become confused about something I'm reading for this class, I go back and try to figure it out" and "If course readings are difficult to understand, I change the way I read the material." The inverse relationship indicates that students who were successful in their courses did not seem to "need" to go back and participate in metacognitive learning strategies to further improve their work or help them to succeed.

These results directly point to the need of increased student support across several indicated areas. Among the major obstacles for student populations in community colleges, and particularly those with high percentages of developmental education needs, are the lacking cognitive strategies that would allow them to study smarter instead of just harder. When study behaviors and support outreach strategies are of almost no consequence with regard to course performance outcomes, it becomes a relevant academic intervention to assist students with more effective ways of learning and developing practices that improve comprehension, concept organization, and knowledge retention.

As the following pathway analysis will further demonstrate, the more successful student population in this study relies largely on control/self-efficacy beliefs and effort management without directly leveraging their motivation strengths, cognitive engagement, and support outreach strategies effectively for their achievements. It has to be assumed that this a result of both the missing underlying conceptualization of these strategies and lacking environmental learning support mechanisms to discover their applied value.

Motivational Pathway Model

As indicated earlier, the theoretical model used as a basis for the re-conceptualized aggregation of the original MSLQ-S scales provides evidence for engaged and disaffected conative patterns that affect student success (Connell et al., 1995) for different populations in different ways. In summary, the model illustrates that academic results are achieved by the appropriate patterns of actions (expressed in physical and mental behaviors), which leverage self-system processes (like beliefs and motivational patterns) for the desired goal achievement. In addition, the individual and environmental context (including demographic and course-related variables), acts as a moderator that is able to facilitate or inhibit the conversion of abilities and behaviors into successful outcomes.

In lieu of an MSLQ-S-embedded set of constructs to assess the effect of context variables proposed by the underlying motivational model (i.e., reflecting student experiences of structure, autonomy support, and involvement provided by faculty), current study purpose was more focused on identifying course-relevant variations across different student populations. This emphasis was intended to raise institutional understanding of performance-moderating variables to facilitate improvements in instructional design and corresponding student support mechanisms to impact student success.

Consequently, we used demographic and course-specific characteristics as context variables to identify their contribution to the rest of the model constructs reflected in our research. The resulting model is depicted in Figures 1 and 2 and Table 6 and intends to provide a more comprehensive understanding of the interactions between the described contextual, self-system, and behavioral components and their impact on academic success. The complex interaction of these variables also provides some indication about the degree to which student self-directedness in the teaching and learning process needs further attention.

While omitting most intra-dimensional statistics for this model in this analysis, as many are depicted largely by the intra-scale correlations shown earlier, there are some significant relationships among context variables that deserve mentioning. The study results did not reveal any gender differences with regard to course-type enrollment (STEM, Credit, Online), but predicted relatively smaller proportions of minorities participating in STEM and Credit courses. This mirrors other internal student data that consistently shows lower college readiness, higher proportions of gateway course failures, and significantly lower FTIC freshmen retention rates particularly for minorities from high poverty neighborhoods, which constitutes most of our service areas. There was also a notably higher proportion of older, non-traditional students enrolled in online classes.

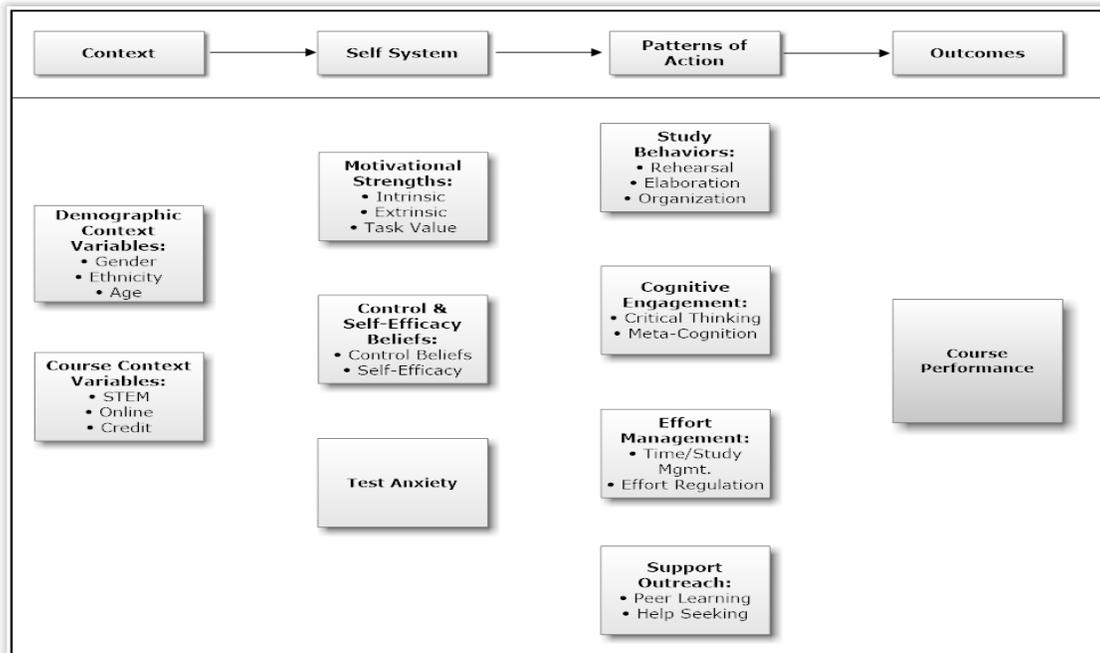


Figure 1: Modified pathway analyses model.

Impact of Context Variable on Self-System Constructs

Considering the described boundaries of our student population, it is not surprising that both motivational and self-efficacy scores are lower for students in STEM courses, while those also display a higher test-anxiety. Students in credit courses show somewhat higher motivational and lower test anxiety scores, as more of them have mastered the pre-requisite and developmental education barriers and can now focus on the courses reflecting their area of interest. For older students we find slightly different patterns. While they display higher motivational scores, they also have higher anxiety levels when it comes to testing. This finding is not surprising since most of them have been away from challenging testing experiences for a while.

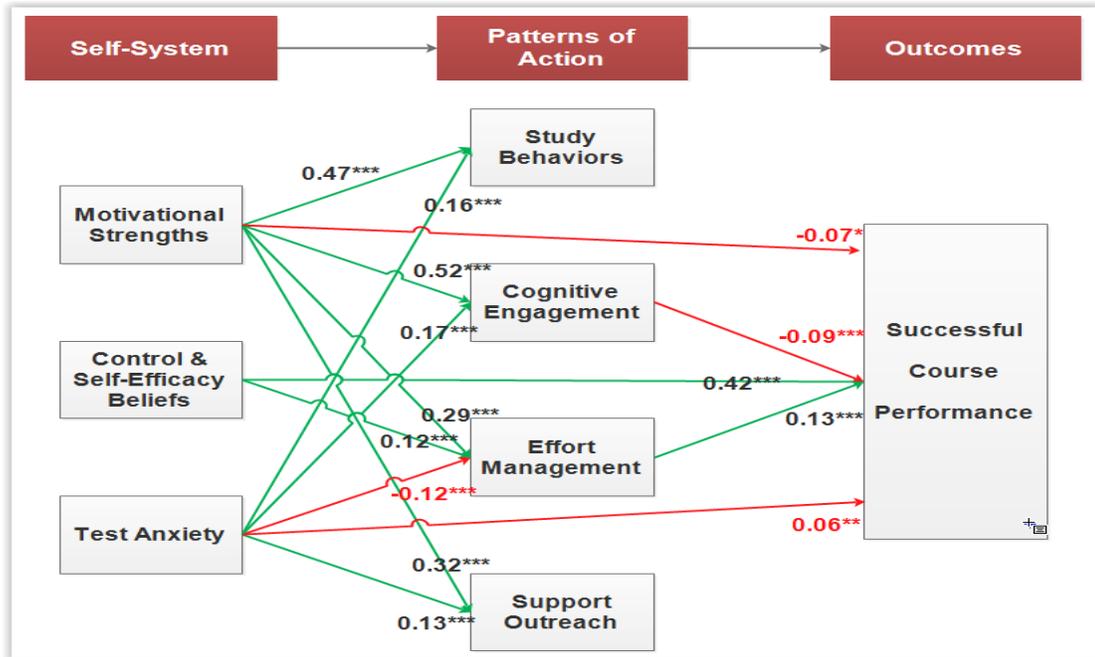


Figure 2. Consolidated pathway model.

Table 6. Stepwise Pathway Analyses Matrix: Predictive Performance Model

	Self-System Constructs			Patterns of Action / Behavioral Constructs				Course Performance
	Motivational Strengths	Control & Self-Efficacy Beliefs	Test Anxiety	Study Behaviors	Cognitive Engagement	Effort Management	Support Outreach	
Model F Value	23.82***	17.84***	15.09***	130.75***	151.64***	100.47***	68.62***	67.65***
R-Square	0.04	0.03	0.03	0.30	0.33	0.25	0.18	0.24
Demo- Female	-0.07***	-0.08***	0.13***	0.12***		0.12***		
graphic Caucasian	-0.06**		-0.06**	-0.04**		0.06***		0.06***
Context Age	0.13***		0.06**	0.12***	0.06***	0.25***	-0.04*	
Course STEM	-0.15***	-0.16***	0.06**	0.05**	-0.04*	0.07***	0.03*	-0.15***
Context Online				-0.04*		0.05**	-0.27***	
Credit	0.04*		-0.04*		-0.06***	-0.06***		0.11***
Self-System Constructs	Motivational Strengths			0.47***	0.52***	0.29***	0.32***	-0.07*
	Ctrl. & Self-Eff. Beliefs					0.12***		0.42***
	Test Anxiety			0.16***	0.17***	-0.12***	0.13***	-0.06**
Patterns of Action / Behavioral Constructs				Study Behaviors				
				Cognitive Engagement				-0.09***
				Effort Management				0.13***
				Support Outreach				

With regard to gender and ethnicity differences, we found that female students in our sample had lower motivational and self-efficacy scores, while indicating significantly higher levels of test-anxiety. Considering the large proportion of females in the sample who also work and have family responsibilities, a motivational “cost of living” impact may be at the roots of these results. The fact that minorities had higher motivational scores certainly indicates their aspiration to succeed where many of their peers still have not, but it is also associated with higher test anxiety that probably reflects the “college readiness gap” described before.

Overall, these findings are helpful for differentiating the needs and issues faced by the local population, and they add another important layer of institution-specific evidence to govern strategic interventions, versus applying general, unspecific research findings from other environments to govern local priorities. On the other hand, the sample and data limitations also indicate further need for institutional research to guide interventions that do not resemble the failed “one size fits all” paradigm. In the current case, expanding the research data with course-specific experiences of autonomy support, faculty involvement, and curricular structure would also help to elevate the low *R*-Square scores (0.03-0.04) for this set of measures, compared to 0.18-0.33 for the remaining model sets. We are planning to address this with a pending expansion of the current instrument to capture at least the essence of these relevant contextual factors as discussed in the Limitations and Summary section below.

Impact of Self-System Constructs on Learning Behaviors

When moving to the next layers of the pathway model, the findings show higher predictive powers and explain between 18% and 33% of the construct variance involved. As for the context variables, females and older students are more engaged in advanced study behaviors and effort management. In contrast, minorities show slightly lower effort management scores and less pronounced advances in study behaviors. Besides some marginal impact of course characteristics on behavioral constructs, we can validate the findings from our previous analyses that indicate a significantly lower utilization of support options across the online environment. This finding also corresponds with a slightly lower support outreach by non-traditional students. Both results, combined with pervasively lower success rates of student in the distance education environment, point to the need for expanded and more adequate peer learning and support opportunities in the online environment. In corresponding results, non-traditional students consistently indicated over time that they rely more on faculty in their help-seeking efforts; however, faculty anecdotally report constraints of time and technology to suitably address those needs.

The predictive impact of self-system constructs shows the very powerful influence of motivational strengths on all behavioral constructs, particularly on study behaviors and cognitive engagement. Interestingly, the degree of control and self-efficacy, so relevant for directly affecting course outcomes, only predicts effort management to a certain degree, but not any of the other patterns of action. The story is somewhat different for test-anxiety, which has a limited but compound impact on learning behaviors. The pathway analysis largely confirms the findings presented in our

discussion of the MSLQ-S's inter-scale correlations. Increasing test anxiety is associated with increases in study behaviors, cognitive engagement, and support outreach, but has a negative association with effort management. It is likely that this is reflecting a two-sided interaction: students with highly effective effort management experience lower test-anxiety since they feel better prepared, while students with high test-anxiety struggle with their effort management since it causes the additional amount of stress that gets in the way of effectively addressing the preparation tasks at hand.

Predicting Course Performance

While the statistical outcomes and predictive parameters do not gain much by including the limited set of context variables, the explained course performance variance still improves from 20% to 24%, and some earlier findings are also mirrored by the higher course performance of white students, the higher average course success in credit courses, and the lower average course success in STEM areas. We have learned in the course of this study from our additional research triangulation efforts in the form of focus groups, course withdrawal surveys, and student's perceptions of instruction-related commentary, how much institutions fail to "connect the dots" by leveraging multiple data sources to produce a deeper understanding of their students' success.

In the course of this study, we were (by design) able to merge many data sources to identify qualitative indicators that reflect the student experiences expressed by these findings. Insight can be gained from some very fundamental student comments: "Many instructors are so busy with teaching the material that need[s] to be covered, that they do not see us anymore," or: "Students that asked too many questions were just ignore[d] and got bad grades." The traditional gap in faculty-student collaboration as part of the learning process is also expressed by faculty comments like: "I can only teach it; if they don't learn it (it's not my fault)."

The fact that higher motivational strengths and cognitive engagement lead to less successful course outcomes where self-efficacy dominates and only effort management contributes shows more or less a replication of the compliant-learning focused high school environment that is more driven by the need of faculty to cover the course materials/content at hand than by the need of the learners to truly understand the taught concepts by independently engaging with the challenges that these materials are posing. It's not by coincidence that the flipped classroom comes to mind!

As more closely depicted in Figure 2, the remaining portion of the analysis confirms what was previously discussed as the absence of other effective self-directed learning factors (particularly higher order learning strategies) while self-efficacy and effort management are the only positive predictors of course performance in our study. This certainly underscores the notion of learner-compliance-driven course success. Basically, students with high confidence that show good efforts but do not ask too many questions and are not so highly motivated that they disturb the designed flow of the class achieve, on average, higher performance rewards than their peers who are equally confident and effort oriented, but not as sensitive to the instructors' need "to learn it their way."

One might wonder, how is it even possible that it does not make any difference if students are showing advanced study strategies/behaviors or are trying to compensate

with more peer learning and help-seeking efforts to offset their knowledge gaps, particularly in an environment where college readiness is more the exception than the rule? Both factors, study behaviors and support outreach, should theoretically play a role in course performance for the study population, but their actual impact is missing as the model shows.

This poses a double-sided problem: if it can be assumed that the associated competencies and priorities are largely underrepresented, any facilitation of these skills and the advancement of higher order cognitive engagement cannot be effectively embedded in the instructional designs without creating the foundation for a scaffolded progress toward more self-directed learning. On the other hand, many students are so used to a learning environment where they are just told what to do, and if they do, are getting rewarded for it, that it is difficult for them to adopt different concepts of learning altogether, as the most recently identified challenges for implementing the flipped classroom clearly indicate (Shell, 2012).

These findings not only strongly suggest an expedited adoption of critical thinking instructional practice as is supported by the Common Core embedded concepts that are currently being integrated into the high-school environment, but they should also serve as an urgent call for postsecondary faculty to expedite expansion of their instruction to include active – engaged learning models. The shift in practice from content delivery to learning-centered instruction that encourages the sometimes inconvenient nuisance of student engagement can overcome some of the troubling consequences noted in the results of this study.

Limitations and Summary

Some limitations of this study must be noted. First, students' self-selected participation by completing the MSLQ-S instrument resulted in some distinct characteristics of the population. Even if, in terms of its demographic characteristics, the survey sample was largely representative of the college's student population, participants enrolled in online courses were, on average, more successful in their course completion than the general population. However, participants enrolled in online courses had a success rate of 86%, versus a 76% success rate of the general student population in these courses, indicating a somewhat higher performing subgroup in this area. The pass rate differences for face-to-face courses (sample = 77%; general = 80%), developmental courses (sample = 69%; general = 71%), and college level courses (sample = 84%; general = 81%) were not statistically significant.

Another limitation, also tied to the self-selected nature of this study, and possibly associated with the positive bias mentioned above (a higher performing online student proportion completed the survey), was the lower number of students who chose to complete the survey from the online courses. Specifically, the low number of study participants who were enrolled in online developmental courses limited the ability to deduce findings pertinent to this specific group of students.

If faculty and educational support areas are able to facilitate advancement of the associated skills and strategies which align to behaviors associated with self-direction, such as increased study behaviors, cognitive engagement, effort management, and

support outreach, it is very likely that academic success will experience a dramatic boost across all student populations. And, as indicated earlier, if the distance learning conditions can be augmented with more effective mechanisms to compensate for the current deficiencies in peer learning and help-seeking options, those improvements might lead to success rates in online courses that are able to overcome the still prevailing gaps between online and traditional delivery formats in terms of student success.

In addition, as colleges continue to face the challenges of open-door admissions and high proportions of academically underprepared students, creating opportunities and experiences that facilitate learning and learning strategies embedded in the content curriculum has the potential to radically shift success rates for students engaged in all types of delivery models and levels of college coursework. Similar to the concept proposed by Ponton, Carr, and Wiggers (2014), self-efficacy to “learn” a topic can be just as instrumental as self-efficacy about the topic itself in terms of student success. Establishing mechanisms for students to create an “identity” as engaged, confident learners, capable of conquering learning tasks, can help to bridge the gap between instructional design and student investment into the learning process (Martin et al., 2014). Integrating strategies to empower learner’s patterns of actions and enhance self-systems can propel students to self-direct and lead to greater student success; however, work with faculty to encourage and academically reward learner non-compliance in the classroom is yet another challenge that must be overcome.

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APPENDIX A

Criteria Used to Eliminate Survey Items from the MSLQ

In order to reduce the survey size and achieve a tighter, yet equally powerful instrument, a multi-pronged approach was applied. The following criteria were used to eliminate survey items from the original instrument:

1. Items that displayed a certain level of redundancy and did not appear to contribute significantly to MSLQ construct correlations with academic performance outcomes in previous studies.
2. Items that showed no correlation with course outcomes or displayed only marginal variances in our internal pilot studies conducted with student populations from Student Learning Success (SLS) courses.
3. Items from the first portion of the cross-sectional study (Fall 2011) that did not show sufficient positive contribution to intra-scale reliability and had very marginal variances across study sub-groups.

The table below summarizes the differences between the original MSLQ (col. 2-3) and the MSLQ-S (col. 4-5 and 6-8) in terms of item counts and alpha reliability coefficients for the original, the reduced, and the reaggregated constructs.

MSLQ Scale Definition	Original MSLQ		Current Study Constructs				
	# of Items	α	# of Items	α	Newly Aggregated Constructs	# of Items	α
Motivational Constructs							
1. Intrinsic Goal Orientation	4	0.74	4	0.74	I. Motivational Strengths	8	0.81
2. Extrinsic Goal Orientation	4	0.62	2	0.62			
3. Task Value	6	0.90	2	0.90			
4. Control of Learning Beliefs	4	0.68	3	0.76	II. Control & Self-Efficacy Beliefs	11	0.95
5. Self-Efficacy for Learning & Performance	8	0.93	8	0.95			
6. Test Anxiety	5	0.80	4	0.75	III. Test Anxiety	4	0.75

TRACKING PATHWAYS TO SUCCESS

Learning Strategies Constructs						
1. Rehearsal	4	0.69	2	0.69	IV. Study Behaviors	6 0.80
2. Elaboration	6	0.75	2	0.59		
3. Organization	4	0.64	2	0.56		
4. Critical Thinking	5	0.80	5	0.80	V. Cognitive Engagement	15 0.88
5. Metacognitive Self-Regulation	12	0.79	10	0.84		
6. Time/Study Environmental Management	8	0.76	7	0.81	VI. Effort Management	11 0.86
7. Effort Regulation	4	0.69	4	0.71		
8. Peer Learning	3	0.76	3	0.77	VII. Support Outreach	6 0.83
9. Help Seeking	4	0.52	3	0.73		
Total Items in Questionnaire	81		61			61

AN EXPLORATION OF SDL AS A CONCEPTUAL MODEL FOR STUDYING NASCENT ENTREPRENEURS

Ernie Post

This study explored how Garrison's (1997) Self-Directed Learning (SDL) model might inform educators' understanding of attrition among nascent entrepreneurs. The study utilized a sequential exploratory mixed method research design, which involved a mixture of qualitative and quantitative inquiry. The sample of learners for both the qualitative and quantitative phase of the study included adult learners who had entered the Small Business Development Center (SBDC) entrepreneurial learning program and then discontinued the program before completing their learning goals. Using the qualitative data from 11 in-depth interviews that were conducted in May and June 2011, a quantitative survey was developed. A total of 243 SBDC learners completed the survey. The principal component analysis asserts an emerging learning model loading 26 variables to form seven components that explained 74% of the variance.

Keywords: entrepreneurs, self-directed learning, entrepreneurial discontinuance

While we know much about how established entrepreneurs learn from their experiences in business, little is known about nascent entrepreneurial discontinuance (Liao & Gartner, 2008). Entrepreneurial discontinuance is defined as an action taken by the entrepreneur to suspend his or her venture during the gestation phase (Liao, Welsch, & Moutray, 2008). Considerable research engages entrepreneurs who succeed because they are easily identified and researchers are interested in the stories of successful entrepreneurs. Less research is conducted with entrepreneurs who fail. Even less research is attempted with nascent entrepreneurs who engage in business start-up activity and then discontinue their entrepreneurial learning activity before actually starting their businesses (Liao & Gartner, 2008). This study helps to fill this gap in the adult learning literature and in the entrepreneurship literature by focusing on entrepreneurial learning discontinuance within the formal context of a Small Business Development Center (SBDC) learning program. The SBDC program is a cooperative effort with the private sector that provides one-stop management, education and technical assistance to current and prospective small business owners. The national

network is comprised of over 1,000 regional SBDCs that help about 1.25 million small businesses each year (Harris, 2005).

Nascent entrepreneurs are choosing a career path that makes them ultimately responsible for their very livelihood, so it is not difficult envisioning them also taking responsibility for their learning. Entrepreneurs are also highly self-motivated and creative individuals who continuously learn as a way to improve their business (Politus, 2005). There are numerous models and assumptions related to SDL. Garrison (1997) defines the comprehensive SDL model as having three dimensions: (a) self-management (control), (b) self-monitoring (responsibility), and (c) motivation (entering/task). *Self-management* is the process in which “goal management, learning methods, support, and outcomes are collaboratively and continuously assessed and negotiated” (p. 22).

The self-management dimension recognizes a collaborative role for the instructor in formal educational settings. Learner learning is done in collaboration with a teacher, mentors, and other actors in the social context through a social constructivist paradigm. The teacher provides support, guidance, and formal standards, which are necessary for a successful educational outcome (Garrison, 1997). This dimension of the model provides insight for this study by acknowledging the important role of the mentor in nascent entrepreneurial learning. Self-management is also concerned with learning proficiency, resources, and interdependence. Proficiency, resources, and interdependence dimensions of this model may provide insight for SBDC educators by considering how well these dimensions had been developed in those learners who discontinue their learning program.

The second dimension of the self-directed comprehensive model, *self-monitoring*, refers to “monitoring the repertoire of learning strategies as well as an awareness of and an ability to think about our thinking and modify thinking according to the learning task/goal” (Garrison, 1997, p. 24). Self-monitoring in this model implies that the learner is responsible for making new meaning through critical reflection, metacognition, and through collaborating with others for confirmation. *Metacognitive proficiency* refers to learners’ ability to think critically and reflectively on their lived experiences. This involves integrating existing knowledge with new knowledge to ensure that the learners are meeting their learning goals. If nascent entrepreneurs are not effective with their self-monitoring skills, they might not perceive themselves as learning enough to continue with their investment of time with their learning program. Consequently, they might be likely to discontinue their SBDC learning program.

The comprehensive SDL model addresses both the learners’ entering motivation and their task motivation. The learners’ entering motivation is contingent upon their rational intentions related to selecting learning goals. The level of learners’ entering motivation is largely dependent on their level of valence and expectancy. *Valence* refers to the degree that the learner is attracted to the learning goals, while *expectancy* refers to the belief that the learner’s desired outcome can be achieved (Garrison, 1997). *Task motivation* is the learner’s tendency to focus on and to persist in learning activities and goals. This conceptualization addresses the different aspects of motivation that prior self-directed learning models have not acknowledged. The motivation dimension

in the comprehensive SDL model also includes learners' personal needs and their affective states.

This model conceives *personal needs* (values) and *affective state* (preferences) as reflecting the degree of valence (Garrison, 1997). The importance of the learning goal to the learner represents the personal needs, including the learner's affective and cognitive states. Affective states are manifest through the learner's attitudes about self, learning goals and task (Garrison, 1997). The degree of valence in this self-directed learning model could provide new insight for this study by considering the interaction between the nascent entrepreneur's affective state and his or her cognitive state and the effect that this interaction has on the decision of an entrepreneur to discontinue his or her educational program. The comprehensive SDL model provides the theoretical lens to this study.

Problem Statement

Yearly, over 100,000 nascent entrepreneurs start a business-planning course in the SBDC program. In the Kutztown University SBDC, close to 60% of the learners discontinued their learning program prior to completion of their learning goals. The evidence suggests that learning activities such as business planning can have a significant positive influence over nascent entrepreneurs' ability to launch a new business (Delmar & Shane, 2004; Liao & Gartner, 2008; Reynolds, 2007). Moreover, business planning is recognized as an important step in the nascent entrepreneurs' learning and in the eventual decision to start the business (Liao & Gartner, 2008). Thus, when nascent entrepreneurs discontinue their business planning programs, it raises concerns because this could reduce the number of new business starts in a regional economy.

Entrepreneurial scholars have found that the conceptual frameworks used to study entrepreneurial learning phenomenon are underdeveloped. There have been relatively few empirical studies that offer insight into how entrepreneurs learn (Cope & Watts, 2000). A theory from the field of adult education that offers potential for informing nascent entrepreneurial learning is the self-directed learning framework. "In essence, self-directed learning is a self-managed or self-motivated process to learn, change and improve" (Guglielmino & Klatt, 1994, p. 164). A number of research studies have linked readiness for self-directed learning to workplace performance, the attainment of leadership positions in organizations, and the characteristics sought after in today's business leaders (Guglielmino & Guglielmino, 2008). Moreover, successful entrepreneurs were found to possess a significantly higher degree of self-directed learning readiness as compared to others in the general population (Guglielmino & Klatt, 1994). Despite this finding, very little entrepreneurial research has used the self-directed learning framework to explore entrepreneurial learning since the original study by Guglielmino and Klatt (1994). Our understanding of entrepreneurial learning would be enhanced by further research on what causes the discontinuation of entrepreneurial preparation (Liao, et al., 2008). Garrison's (1997) comprehensive SDL model could

provide refreshing new insight to the nascent entrepreneurial learning literature that is concerned with those who discontinue their educational programs.

Purpose

The purpose of this mixed method research study was twofold: (a) to determine the factors contributing to nascent entrepreneurs' discontinuance of their short term entrepreneurial learning program in a formal setting, and (b) to explore how the self-directed comprehensive learning model might help to inform nascent entrepreneurial educators mentoring within a short term formal educational program. The study was guided by the following research questions:

1. Which factors connected with the SDL comprehensive model might contribute to nascent entrepreneurial participation or discontinuance in the SBDC learning program?
2. What other components might emerge in a conceptual model involving nascent entrepreneurs who were participating in a short-term formal entrepreneurial extension education program?

Research Design

A sequential mixed method design methodology was used, with the findings of the qualitative study contributing to the construction of the quantitative survey instrument (Creswell, 2003; Creswell & Clark, 2007).

Sample

The sample for the study included only those learners who participated in at least one mentoring meeting and one workshop in the SBDC program in 2010 and 2011. A purposeful sample for the qualitative phase of the study allowed inclusion of a sample selection that is representative of the Kutztown University SBDC characteristics for nascent entrepreneurs. Participants were selected from the SBDC client pool to represent diversity in ethnicity, gender, education, and age. The 11 participants in the qualitative study included four Latino women, two Latino men, two White women, two White men, and one Indian man. Four of the participants were 21 to 35 years of age, 5 were 36 to 55, and 2 were between the ages of 56 and 72. The educational attainment included 5 with some college, 4 with a bachelor's degree, and 2 with a master's level degree. Only those who considered themselves unsuccessful in meeting their goals for the program were included in the qualitative phase of the study.

In the quantitative phase of the study, learners self-identified if they perceived themselves as successfully completing their SBDC learning goals. Guglielmino et al. (2005) reported that self-directed learners sometimes discontinue formal programs or individual learning projects when they determine that they have met their learning goals; consequently, the definition of success in the SBDC learning program for this

study was dependent on how the learners identified themselves as either successful or unsuccessful with their entrepreneurial learning goals.

In the quantitative phase, a total of 2,131 learners of the KUSBDC program were emailed the survey and 243 completed surveys were included in the analysis, representing an 11.4% response rate.

Instrumentation

Interview Protocol. Because little was known about the challenges that nascent entrepreneurs experience that may contribute to discontinuing their learning programs, it was important to have flexibility in conducting the interviews so that participants' responses could be explored further. The guided interview technique represented a middle ground between the very structured standardized interview and the unstructured conversational interview (Patton, 2002). The guided interview approach allowed the interview to be more systematic, while limiting in advance the elements to be explored. In addition, this format allowed collection of other information that was raised spontaneously by the participant, but kept the initial queries focused on the predetermined questions initially identified and agreed upon between the dissertation committee, Office of Research Protection, and the researcher.

Because the purpose of this study was to gain insight about the challenges of those who discontinue a learning program, the interviews themselves focused on the verbal descriptions of students' experiences, thoughts, and feelings while they were enrolled in the SBDC learning program. The questions explored the expectations that the learners had when they entered the educational program and how those expectations were or were not met, as well as personal learning challenges encountered (Appendix A).

Nascent Entrepreneur Survey. Sequential mixed-method design methodology is based on the qualitative study guiding the construction of the quantitative survey instrument. In addition, the literature review, the comprehensive SDL model, and the data collected during the qualitative phase of the study guided the survey question development. A total of 26 questions, with a five-point Likert response, were designed in consultation with members of a faculty team with the intent of capturing the participants' perceptions of how strongly they agreed or disagreed with questions that measured various constructs that emerged through the qualitative study. One question asked participants if they believed (i.e. yes/no) that they had successfully completed their entrepreneurial learning goals. Another question asked respondents to identify the obstacles that they encountered during their engagement with the entrepreneurial learning program. The multiple response choices were developed from the themes developed during the qualitative study. The survey then asked two questions related to determining the participants' perceptions of their experience with the SBDC learning program, followed by a request for participants to self-identify their current business status. A number of questions were selected to help better understand how learner perceptions regarding the contextual factors of the learning program affected learner motivation to continue with the entrepreneurial program

Additional survey questions measured constructs associated with the comprehensive SDL model (Garrison, 1997). This adult learning model describes three key dimensions that help to define an adult learner's self-directedness in formal educational settings (i.e., motivation, self-management, and self-monitoring). For each of the three comprehensive SDL model dimensions a number of questions (variables) were developed to capture various aspects of the comprehensive SDL model, including three questions related to motivation-expectancy, three questions related to motivation-affective, one question for motivation-task, one question for motivation-contextual, one question for motivation-entering, two questions for motivation-personal characteristics, five questions pertaining to self-management, and eight questions pertaining to self-monitoring. Finally, learner characteristics such as demographic, family background, and future intentions to start a business were asked of the participants.

Following the development of the survey, several faculty members with expertise in entrepreneurship, survey design, and adult learning were consulted to comment on the instrument for further refinement. The instrument was then piloted with a group of 24 existing nascent entrepreneurs enrolled in the SBDC entrepreneurial learning program. Feedback from the pilot study was used to refine the final instrument.

Procedures

Qualitative

The learners for the qualitative phase were emailed an invitation to participate with the offer of a \$25 stipend for their time. Six of the interviews were conducted in person and five interviews by phone. Each interview took about an hour to complete. Each interview was recorded and transcribed, and participants were emailed the interview transcripts as a member check for accuracy. Field notes were taken at the beginning and at the close of each interview, noting non-verbal cues observed during the interview. In addition, the transcripts were read and interpreted to reveal emerging themes. Then, through a series of iterations, the data were organized into logical themes that emerged from the individual narratives. Four major themes emerged: (a) entrepreneurship and motivation, (b) entrepreneurs and their family interactions, (c) entrepreneurs' situational barriers, and (d) entrepreneurs' perceptions of the SBDC learning program.

The qualitative data provided the language or terminology to help develop the survey. Use of the qualitative data ensured that the language and terminology used in the survey instrument had meaning for the participants because the language emerged from SBDC participants' own quotes (Creswell, 2003).

Quantitative

For the quantitative phase, participants were invited via email to complete the Nascent Entrepreneur Survey online. A total of 243 surveys were deemed to be valid for analysis. SPSS 19 was used to perform a Principal Component Analysis (PCA). The PCA was performed using a Promax rotation with a regression analysis. The sample

mean was used to replace the missing data. I elected to reduce the eigenvalue from 1 to .7, as it is an acceptable data reduction procedure (Jolliffe, 1972).

Major Findings

Qualitative Findings

The qualitative findings were based on 11 in-depth interviews with selected KUSBDC learners who had left the program prior to completing their learning goals. The data gathered from this phase of the study was used to help develop the quantitative survey. The qualitative findings are highlighted in the following schema:

1. Entrepreneurship and motivation
 - a. Need for independence, creativity and commitment
 - b. Motivational factors affecting SBDC participation
2. Entrepreneurs and their family interactions
 - a. Negative experiences and emotions
 - b. Positive experiences and emotions
3. Situational obstacles faced by entrepreneurs
 - a. Lack of financial resources
 - b. Lack of knowledge about SBDC learning resources
 - c. Lack of time and scheduling conflicts
4. Entrepreneurs' perceptions of the SBDC learning program
 - a. Perceptions of the SBDC learning program
 - b. Learners' recommendations for the program

Participants discussed a wide range of topics during the semi-structured interviews. These topics ranged from motivation, the role of family, the affective experiences that they felt while involved in the SBDC program and their recommendations for improving the program. In addition, they openly discussed the obstacles that prevented them from continuing with their learning program and they discussed areas where they lacked knowledge. Finally, the participants shared some useful observations and comments for future program developers to consider.

Motivation was most negatively affected when participants concluded that they were not going to be able to obtain the financing that they needed to start their business. The role of family members was also a major theme. For some learners, family was reported as a positive motivating force for learners to continue with their entrepreneurial learning; for others, family was reported as a source of conflict during the learning program. The source of conflict from a family member was often described as a spouse who was not supportive of the learner's decision to leave employment to start what was perceived as a risky business venture. These participants were also motivated by their internal passion to be doing something that they really enjoyed doing, resulting in the positive emotions stemming from being independent and free.

Learner recommendations for the program were varied. Some enjoyed the online learning and flexibility with webinar programming. Others preferred the live group oriented learning. Some found the mix of existing business owners with nascent

entrepreneurs to be distracting. Others found this mix helpful and were motivated by hearing that others like themselves could accomplish their business goals. Most of the interviewees agreed that smaller class sizes would be helpful, as some found it difficult to get answers to their specific questions during the class time. The qualitative phase of the study helped to guide development of the survey questions for the quantitative phase of the study.

Quantitative Findings

The data from the 243 returned surveys was used to perform a principal component analysis (PCA) to determine how the variables loaded. Table 1 displays the PCA yielded a KMO value of .912, with 325 df and a $p < .001$ (Post, 2014). The loadings reduced the 26 latent variables to seven components found in Tables 2 and 3. KMO values above .9 are considered superb (Field, 2005). Moreover, the model explained over 74 percent of the variance.

Table 1. *Principal Component Analysis: KMO and Bartlett’s Test*

Kaiser-Meyer-Oikin Measure of Sample Adequacy	.912
Bartlett’s Test of Sphericity Approximate Chi-Square	2546.404
Degrees of Freedom	325
Significance	>.001
Determinant	1.53E – 008

KMO over .9 is considered superb (Field, 2005)

Table 2 displays the PCA total variance explained by the model. The highest percent of variance was explained by the social/emotional interaction component (41.8%); followed by mentor and instructor facilitation, explaining 10.4% of the variance; followed by self-management, explaining 5.7% of the variance (Post, 2014). Together all seven components explained 74% of the variance.

Table 2. *Principal Component Analysis: Total Variance Explained*

Initial eigenvalues				
Component	Total	% of Variance	Cumulative %	Rotation SSL Total
Social/Emotional	10.876	41.832	41.832	7.816
Facilitation	2.724	10.478	52.310	7.410
Self-management	1.504	5.786	58.096	3.675
Self-monitoring	1.460	3.707	63.711	5.690
SDL readiness	.964	3.612	67.418	2.961
Contextual	.939	3.035	71.030	6.749
Self-perception	.789	2.574	74.065	6.924

SSL: Sum of Squared Loadings

Table 3 displays the pattern matrix results and the individual variable loading value (Post, 2014). All variable values were over .300 and accepted as important (Field, 2005). Those variables that addressed the learner’s positive emotions and the reduction

of negative feelings grouped together. Most of these variables referenced the sharing of emotions with a peer, family member or instructor; this group of items was named the social/emotional component to capture the importance of the social interaction in positive emotions that surfaced during the qualitative phase of the study. The component accounting for the next-largest percentage of variance related to variables describing the interaction and competency of the instructor/mentor.

The next three components grouped three variables together to form different dimensions of the comprehensive SDL model that describe aspects of self-management, self-monitoring and self-directed learning. There were three variables that related to contextual elements of the learning program; these grouped together and are referred to as the contextual congruence component. The final three variables grouped together all related to an aspect of self-perception: of experience, knowledge, and motivation.

Conclusions and Recommendations

This study discusses how various dimensions of the comprehensive SDL model are evidenced in nascent entrepreneurial learning in a formal, structured entrepreneurial learning program. The comprehensive SDL dimensions of motivation, self-management, and self-monitoring were found in the PCA components; however, other variables grouped in the PCA model to form the social/emotional and facilitation components accounted for a larger percentage of the variance.

The importance of the social/emotional interaction was also a major theme in the qualitative phase of this study. During the qualitative phase of the study, both positive and negative emotions were often triggered by interactions with family members, other learners in the program or with the instructor/mentor. When learners experienced negative emotions their level of motivation decreased. This would be likely to make it more difficult for the learner to overcome obstacles that might have otherwise been surmounted.

The results of this study suggest that an important element of entrepreneurial success may stem from the ability of the learners to gain the support of family members. When learners experienced positive reinforcement from a family member toward the pursuit of an entrepreneurial career path, they experienced more positive emotions. Positive emotions helped to sustain the learner through various obstacles that may have been encountered such as scheduling conflicts and other demands on the learners' time. Conversely, when negative emotions were exhibited from family members toward the learner, the learner experienced a loss of motivation to complete the entrepreneurial learning program.

The facilitation dimension may be especially important to entrepreneurs because of the higher degree of financial risks that many nascent entrepreneurs are considering undertaking by launching a business. In the qualitative phase of the study, the learners suggested that they were looking for mentors and instructors who could help them avoid costly mistakes. They were seeking a mentor who had been in a similar type of business, who could coach them on how to start a business successfully, and who could answer specific questions.

Table 3. *Principal Component Loadings: Pattern Matrix Results*

<i>Principal Component Loadings: Pattern Matrix Results</i>							
Component	1	2	3	4	5	6	7
Social/emotional interaction							
Learned from others	0.947	-0.107	0.155	-0.376	0.002	0.219	-0.122
Reduced my anxiety	0.719	0.208	-0.125	0.115	-0.063	-0.008	0.083
Feel more confident	0.703	0.267	-0.07	-0.113	0.026	-0.065	0.15
Talked with others	0.617	-0.121	0.174	0.17	0.001	0.132	0.02
Reduced my frustration	0.58	0.221	-0.102	0.208	-0.017	0.006	-0.044
Motivated at end	0.425	0.048	0.228	0.112	-0.057	0.047	0.288
Facilitation							
Mentor had experience	0.091	0.95	0.193	-0.114	-0.073	-0.072	-0.162
Instructor helpful	0.161	0.933	0.057	-0.16	0.077	-0.099	0.004
Inst. let student set pace	0.015	0.814	-0.013	0.115	0.091	0.051	-0.112
Learning was relevant	-0.017	0.453	-0.111	0.177	0.046	0.388	0.025
Linked to other learning	0.303	0.318	-0.111	0.13	0.011	0.23	-0.012
Self-management							
I set time frames	0.048	0.104	0.751	0.472	0.032	-0.187	-0.223
I am self-disciplined	0.158	-0.001	0.727	0.138	0.035	-0.118	0.172
I manage time well	-0.076	0.071	0.7	0.015	0.014	0.161	0.177
Self-monitoring							
I assessed my progress	-0.107	-0.062	0.216	0.884	0.001	0.073	-13
I evaluate my own work	-0.049	-0.05	0.166	0.645	0.047	0.061	0.289
I enjoyed the challenge	0.305	0.041	-0.03	0.371	-0.199	0.076	0.255
Self-directed readiness							
I evaluate my learning	-0.092	0.002	0.063	0.128	0.903	0.119	-0.146
I set learning goals	-0.082	0.088	0.04	-0.006	0.832	-0.086	0.132
I make learning decisions	0.152	0.005	-0.081	-0.221	0.624	0.019	0.385
Contextual Congruence							
Easy to understand	0.148	-0.008	-0.079	-0.01	-0.032	0.803	0.044
Free from distraction	0.235	-0.107	0.305	-0.044	0.059	0.758	-0.252
Program easy to access	-0.028	0.072	-0.22	0.246	0.027	0.758	0.012
Self Perception							
I possess experience	0.065	-0.111	0.02	0.071	0.111	-0.126	0.884
I possess knowledge	0.165	-0.192	0.062	0.219	0.058	-0.037	0.762
I possess high motivation	-0.402	0.31	0.369	-0.172	-0.147	0.235	0.496
eigenvalue = .7, Promax rotation, Regression Method, Means Replaced Missing Data							

Self-management, self-monitoring and self-directed learning readiness were important dimensions of learning for these nascent entrepreneurs according to the quantitative findings of the study. Although these dimensions did not surface as major themes in the qualitative phase, they are core dimensions of the comprehensive self-directed learning model (Garrison, 1997). The qualitative phase did uncover a strong need for nascent entrepreneurs to be independent, creative and committed. This suggests a desire for control (i.e. self-management) of their learning goals, as well as a high degree of learner responsibility (i.e. self-monitoring) toward their entrepreneurial learning goals.

There are several recommendations from this study that formal adult entrepreneurial education programs might consider for future programming. Because family support is so important to nascent entrepreneurs it might be helpful for programs such as the SBDC to encourage spouses, significant others and close family members to attend some of the educational workshops as a way to foster this support. In addition, during the workshops mentors could integrate more social interaction with family members and peers as a way to practice using others to help the nascent entrepreneur learner refine her/his business model. Moreover, programs such as the SBDC may want to consider connecting the nascent entrepreneurial learner with other established entrepreneurs who would be willing to share some of their expertise with new fledgling entrepreneurs as a way to increase the mentor value that these learners are seeking. Finally, the program could include a self-directed learning assessment at the early stages of the learning program to help customize the learning program based on the degree of self-directed readiness. For example, if an individual is low in the ability to self-manage his or her own learning program, then additional tools and guidance could be provided that would help the learner better assess learning progress and outcomes.

This study adds to the existing research of Guglielmino and Klatt (1994) that established the high level of readiness for self-directed learning among entrepreneurs. The study also adds to the existing research on adult learner participation and attrition in short-term formal education settings. This research could start the discussion about how the comprehensive SDL model could provide a viable adult learning model for nascent entrepreneurial learning. Given that the field of entrepreneurship lacks a unifying theory of learning, this study might spur others to do further research with nascent entrepreneurs using the dimensions of the comprehensive SDL model. As the literature review highlighted, the adult education and entrepreneurship literature intersects with many of the learning dimensions that are related to the comprehensive SDL model and self-directed learning research.

Generalizing these findings to other populations is not recommended because of the limitations of this study using the PCA model for factoring and because the sample represented only one SBDC program. Future studies might consider expanding the sample beyond one center and utilizing a factor analysis to determine how well the components in this study transfer to other populations.

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APPENDIX A QUALITATIVE SURVEY

Introduction and Consent Form

Do you have any questions or concerns about the consent form that you would like answered before we get started? This interview will take about 45-60 minutes to complete and you may end it at any time or simply tell me if you have no response to a specific question.

Interview Questions:

When you hear the word entrepreneur what comes to mind?
How would you describe yourself as an entrepreneur?
When did you first think about being an entrepreneur?
What was the occasion? Who was involved? What were your thoughts?
What did you need to learn in order to start a business?
How did you go about learning about this?
What led you to your participation in the PASBDC program?
What did you expect from the program?
Did you get what you wanted?
Could you describe generally your experiences with the SBDC entrepreneurial learning program?
What sort of activities were most helpful, least helpful etc.
Tell me about your SBDC or SCORE mentor.
Were you able to communicate effectively with your mentor?
What message did they communicate to you?
Which part of the content of the PASBDC curriculum were you able to relate to the best?
Which content was the most challenging for you? (Which course are they describing?)
Tell me about your business planning progress? Tell me how developing the business plan helped you learn?
What sections of the business plan presented the most difficulty in writing?
What sections of the business plan development was most relevant to your situation?
Overall, tell me what aspect of the SBDC learning was most relevant to your situation?
What was least relevant?
What has prevented you from taking part in more of the educational program offerings of the SBDC?

For those who have left the program and have disengaged the program services, follow with the next questions:

What were some of the reasons you decided to stop taking workshops or going for mentoring? What factored into that decision?
Tell me how that decision and your decision about starting the business might have been related- if at all?
Can you think of 2 or 3 recommendations you would make for the SBDC program to make it more useful for future entrepreneurs like yourself?
Is there anything that I did not ask you today that you wish I had asked?

Field notes: General observations about the interview:

**GEOGRAPHY STUDENTS' AND STUDENT TUTORS'
PERCEPTIONS OF THEIR SELF-DIRECTEDNESS IN
LEARNING IN AN INTEGRATED PBL MODEL: AN
EXPLORATORY STUDY**

Aubrey Golightly and Lucy M. Guglielmino

Tertiary institutions and schools need to prepare learners to engage in self-directed learning (SDL) practices, not only to improve and enhance their learning skills, but also to prepare them for lifelong learning beyond the institution's walls. This study, in a South African context, explores problem-based learning (PBL) as one of the teaching and learning strategies that offers potential for enhancing SDL readiness. Success in enhancing readiness for SDL has been reported when pure PBL models have been used; however, the results for hybrid PBL models have been mixed. Since transitional structures and gradual implementation appear to be important for those inexperienced with PBL, this exploratory study examines implementation of a hybrid PBL model within an initial teacher education class of students without previous experience with PBL.

Keywords: self-directed learning, problem-based learning, teacher education, hybrid PBL formats, transition structures to support SDL

In view of the information and technology revolution of the 21st century, the traditional didactically-oriented education system is ill-equipped to instill in students the lifelong learning skills needed in the workplace today. McCauley and McClelland (2004) point out that schools and tertiary institutions should provide teaching-learning opportunities that consist of more than students passively receiving information, even though that is exactly what happens in most traditional classroom settings. Frenk et al. (2010) concur that the next generation of learners needs the capacity to discriminate vast amounts of information and extract and synthesize knowledge. Guglielmino (2008, 2013) and Lublin (2003) state that the times we live in require continuous lifelong learning and relearning by each individual, and no educational institution can hope to meet the demand for delivering that instruction. Although a student can become a self-directed learner without explicit instruction and development of these traits, it is more likely to occur when teachers, lecturers and administrators understand and foster SDL in educational settings (Lumsden, 1999). It is therefore necessary for educators at tertiary

institutions to actively involve students in the learning process by integrating learner-centered instructional approaches such as problem-based learning, case studies, role-play and project-based learning in the different programs and modules. Learning approaches such as these give students opportunities to improve skills in lifelong and self-directed learning (Billings & Kowalski, 2005).

Given the legislative framework of South Africa, its educational policies, as well as the importance of preparing learners to participate and contribute to a democratic society, it becomes clear that in the South African context the development of responsible and self-directed learners is viewed as important (Bekker, 2007). In particular, students preparing to be teachers are key links in the development of awareness to promote and foster self-direction in an education setting. Teachers are seen to play a pivotal role in providing an environment conducive to the development of responsible and self-directed behaviors in learners.

In the review of the literature within a South African context it is evident that despite the purported adoption of learner-centered instruction embedded within a constructivist approach in the educational system, teachers in most schools in South Africa still have a long way to go in implementing learner-centered instructional approaches in the classroom. A key element in constructivism is that the learner is an active contributor to the learning process, and that teaching methods should focus on what the learner can bring to the learning situation as much as on what is received from the environment (Rowe, 2006). Unfortunately, most South African teachers still use direct teacher-centered instructional approaches in their classrooms and are proclaimed as the “authority” in the classroom and the sole provider of information to learners. Research by Rambuda and Frazer (2004), De Waal and Grösser (2009) and Alexander, LeRoux, Hilale, and Daries (2010) confirms that most teachers still strongly focus on teacher-centered instructional approaches in their classrooms. However, Shultze (2003) found that most teachers in South Africa seem to be willing to move towards more meaningful learning. In her opinion, formal education in this country is characterized by many years of teaching via rote learning and according to certain subject requirements. Under these conditions cultural influences encourage the view that the teacher is always in charge of the classroom. According to De Waal and Grösser (2009), there is evidence that some teachers use teaching to foster autonomy and self-direction. However, the researchers advocate a stronger focus on balancing teacher-centered instructional approaches with a mediation or facilitation approach to teaching in South African schools.

Obviously, if there is going to be any major change in South African schools regarding how we perceive teaching and learning, the change must begin in teacher education with education students. It is therefore necessary to involve South African education students more in self-directed learning environments.

Self-Directed Learning

The definition of SDL varies throughout the literature, and Ainoda, Onishi, and Yasuda (2005) point out that the term is often used interchangeably with educational concepts such as lifelong learning, active or independent learning, and student-centered or

learner-centered education. The most common definition is that of Knowles (1975), who defines self-directed learning as:

...a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

A basic tenet of self-directed learning is that the learner participates cognitively and actively in the learning process, including goal setting (Pintrich, 2000), selection and modification of learning strategies (Chan, 1993), information processing and active construction of new knowledge (McCombs, 2001), cognitive processing (Long, 2005), self-monitoring of learning progress (Zimmerman, 1998), and self-adjustment based on reflection and feedback. Students are given choices and encouraged to make decisions as well as accept responsibility for associated consequences (Bekker, 2007; Lloyd-Jones & Hak, 2004).

The successful introduction of SDL into curricula requires adequate teacher and student preparation; the challenge for educators involved in teacher training to promote SDL is to create learning environments and spaces in which it can be developed (Levett-Jones, 2005). Students as well as educators must possess a clear understanding of the concept of self-directed learning and educators must select the appropriate teaching and learning strategies to facilitate and enhance learners' abilities in becoming self-directed. A learner cannot begin to develop as a self-directed learner unless supported by a curriculum and learning environment that encourage the development of responsible and self-directed behaviors (Abdullah, 2001; Levett-Jones, 2005).

Problem-Based Learning (PBL)

The PBL process

In the PBL process the teacher or educator creates a realistic problem, based on desired curriculum outcomes, student characteristics and compelling problematic situations from the real world (Fournier, 2002). The PBL process, according to Simons, Klein, and Brush (2004), is anchored by a complex, ill-structured problem (i.e., one for which there are many solutions and many paths to solutions), which is presented first. The problem discussion takes place before students receive other curriculum inputs; their prior knowledge is all-important (Hmelo-Silver, 2004). The students are organized into small tutorial groups where they function as members of a team and learn collaboratively by sharing their newly acquired knowledge (Dolmans, Wolhagen, Van der Vleuten, & Wijnen, 2001). The social negotiation of meaning is an important part of the learning process. The students begin to work on the problem and reconceptualize their problem into more specific learning issues (Järvelä, 2006). These learning issues are conceptualized into different learning tasks and delegated to different team members who have to complete the tasks in their own time. Students have to explore various kinds of information using library resources, textbooks, maps and databases, as well as

laboratories, field studies tools, techniques and procedures. They argue and debate to explore perspectives on their problems and learning needs. They need to critically evaluate relevant literature resources (Schmidt and Moust, 2000) and come back to the next tutorial with new information to share, ready to peer teach and work on the problem together (Lam, 2009).

After the students have discussed and analyzed the problem in their tutorial groups, they gather and apply their knowledge to solve the problem by presenting one or multiple solutions (Tick, 2007). At the end of the PBL process students are involved in peer and self-assessment. During the PBL process the tutor stimulates the discussion, provides students with relevant content information if needed, evaluates the progress, and monitors the extent to which each group member contributes to the group's work. Tutors should engage actively in didactic conversations with the learners and provide appropriate scaffolds (Schmidt, Van der Molen, TeWinkel, & Winjen, 2009).

PBL Models

Many variations of PBL models are generated and practiced in educational settings. Barrows (1986) proposes a taxonomy that classifies PBL into six categories using two variables, namely self-directedness and problem-structuredness. Six representative PBL models can be identified as a result: (a) pure PBL (learning initiated by the need to solve a real world, ill-structured problem, no lectures); (b) hybrid PBL (pure PBL supported by a few lectures); (c) anchored instruction (students possess basic content knowledge before engaging in the problem-solving activities, which comprise the major portion of the course); (d) project-based learning (learning initiated by the facilitator--students possess basic knowledge before engaging in the project; project activities comprise the major portion of the course); (e) case-based learning (learning initiated by the facilitator, accompanied by case analysis/study); and (f) instruction with problem-solving activities (learning comprised of lectures, accompanied by a few problems for practice at the end of the course) (Duffy & Cunningham, 1996). It is interesting to note that Trevitt and Grealish (1994) and Kivela and Kivela (2005) also refer to another PBL model, an integrated PBL. In this category, "pure" PBL as a teaching and learning strategy is for a period of time embedded in a traditional teaching curriculum, which is usually based on teacher-led or lecture-delivered learning, to allow for self-directed PBL activities.

It is no surprise that a pure PBL model that requires students to use a full degree of self-directed learning and solve ill-structured problems is likely to result in better development of self-directed learning skills when compared to other PBL models where there is more assistance and guidance from facilitators or tutors (Lee, Mann, & Frank, 2010). Therefore, most of the evidence supporting PBL in fostering SDL has been reported by schools with "pure" PBL curricula. (Bao, Iturbe, & Pelayo, 2010; Blumberg & Michael, 1992; Hmelo & Lin, 2000; Koh, Khoo, Wong, & Koh, 2008; Litzinger, Wise, & Lee, 2005; Lycke, Grottom, & Stromso, 2006; Ryan, 1993; Schmidt, Vermeulen, & Van der Molen, 2006).

In contrast to the above optimistic view of the effect of PBL on SDL, the evidence from integrated or "hybrid" PBL models on SDL is rather inconsistent. Mifflin et al. (1999) reported that instead of developing self-direction, students became overly

dependent on faculty direction in the first year of their hybrid PBL curriculum. Another study on an integrated PBL curriculum in the United Kingdom reported that student learning was not self-directed; rather it was socially agreed amongst the peer group and directed by resources provided by the faculty (Lloyd-Jones & Hak, 2004). Harvey, Rothman, & Frecker (2003) found no evidence at the Faculty of Medicine, University of Toronto, that students' self-reported SDL was positively influenced by the hybrid curriculum. They also reported no significant change in medical students' SDLR scores, whereas Walker and Lofton (2003) reported a decrease in SDLR scores of pharmacy students in the first 16 weeks of their PBL program. These hybrid PBL models, incorporating relevant contextual features of both PBL and traditional curriculum, have become quite common. Therefore, more evidence is required to understand whether the hybrid PBL models actually lead to students becoming more self-directed learners.

Problem-based learning (PBL) and Geography Education

PBL has had little impact on teacher education compared to other professional fields (Hmelo-Silver, 2004). Kwan (2008) confirms that little use has been made of PBL in initial teacher education. She points out that problem-solving using authentic problems and scenarios seems to be a sensible direction to take for preparing young professional teachers. With reference to geography, Pawson et al. (2006) confirm, "*there is little information available regarding the scope of use of PBL and PBL hybrids in Geography courses and curricula.*" This is surprising, as Chappell (2006) points out that the inter-disciplinary nature of geography can fit well within PBL as a framework for teaching and learning.

Boud and Feletti (1997) assert that a PBL environment is one of the most powerful teaching and learning strategies for encouraging students to take responsibility for their own learning. PBL depends heavily upon the principles of SDL and appears to have a large and potentially long-lasting impact on self-directed learning skills (Jackson, 2003; Rideout & Carpio, 2001). Veldman, Mokhele, De Wet, and Boucher (2008) clearly state that, in a South African context, very few teaching and learning strategies can achieve the quality of learning that is attained when using PBL. They propose that PBL satisfies all the requirements to help achieve the educational outcomes and aims as prescribed by the South African government (South Africa Department of Education, 2011); however, most South African education students have not yet been exposed to PBL. Research on effective ways to introduce PBL into the curriculum could provide a foundation for positive change toward meeting the stated aims of developing responsible and self-directed learners (Bekker, 2007).

Purpose and Research Questions

The purpose of this study was to examine the readiness for self-directed learning of undergraduate teacher education students and their tutors before and after a six-week problem-based learning experience integrated into a traditional two-semester geography course. Further, relationships among study participants' SDL scores, perceptions of

PBL, and perceptions of the functioning and support of their PBL group members were explored.

The following research questions guided the study:

- Are there differences in the level of readiness for self-directed learning among first-year Geography education students and student tutors before and after participation in PBL experiences in Geography modules?
- Are there differences between male and female geography students' and student tutors' perceptions of their readiness in SDL before and after participation in PBL experiences?
- Are there relationships among students' perceptions of PBL, the functioning and support of group members in PBL tutorials, and their perceived readiness for self-directed learning?

Research Procedure

This study took place within the PBL sub-project as part of the Self-directed Learning (SDL) project at the North-West University. The university's ethics committee approved the SDL project and it complied with all the ethical regulations of the university. The participants had to provide written consent that the information could be used in this study. Participation was voluntary and any participant could withdraw at any time. An orientation to PBL was provided to both students and student tutors at the beginning of the implementation of the six-week PBL module, which spanned the last three weeks of the first semester and the first three weeks of the second semester of first-year teacher education students enrolled in a geography course. Creswell (2009) was the primary resource for the research design.

Sample

The sample consisted of students in a teacher education preparation program enrolled in geography classes at a university in South Africa. First-year students ($n = 73$) and fourth-year students acting as tutors ($n = 23$) in 2012 and 2013 participated in this study. The demographic background of the education student participants was as follows: 63 (88%) white students, eight (11%) mixed-race students and one (1%) black student; 45 (63%) females and 27 (37%) males. The students' ages ranged between 18 and 20 years. In the geography student tutor group there were 8 male and 15 female geography student tutors.

Instruments

The Self-Directed Learning Readiness Scale/Learning Preference Assessment (SDLRS/LPA) was used in this study (Guglielmino, 1977). The researchers decided on the SDLRS as it has the most extensive literature foundation. Merriam, Caffarella, and Baumgartner (2007) note it is the "most frequently used quantitative instrument in studies of SDL" (p. 121). The SDLRS-A is a 58-item, five point Likert scale instrument that produces a total score for self-directed learning readiness. A high score implies

that a student requires less guidance in learning than a student with a lower score. The range of the instrument is between 58 and 290, with the mean score for adults at 214.00 + 25.59. The reliability and validity of the SDLRS has been examined over many studies in a multitude of contexts. Reliability and content, construct, and criterion-related validity have been demonstrated in many studies (Delahaye & Choy, 2000). The Afrikaans version of the SDLRS instrument was used, as the home language for the majority of the participants was Afrikaans. Afrikaans is one of South Africa's official languages and the medium of instruction at the university. Reliability of the SDLRS for geography students and tutors in this study as measured by the Cronbach alpha reliability coefficient was .91. This correlates quite well with the findings of De Bruin, Jacobs, Schoeman, and De Bruin (2001) in a South African context, who in their study found Cronbach alphas of .90 and .91 for Afrikaans- and English-speaking students respectively.

The researchers also used a short self-designed PBL questionnaire to determine students' perceptions of PBL as a teaching and learning strategy, as well as group members' support and functioning in PBL tutorial sessions. They measured students' perceptions of PBL (five items) as well as the support and collaboration of group members in PBL tutorials (five items). The items were rated from 1 (low level of agreement) to 5 (high level of agreement). The reliability of the PBL questionnaire for the sections in this study (Cronbach alpha) was .89 and .88 respectively.

PBL Orientation for First-Year Students

The preparation of the first-year geography education students of 2012 and 2013 for the implementation of PBL included an orientation session in the form of a two-hour workshop, with additional notes. The presentation and notes contained important information relating to the process of PBL, role expectations of the students and tutors, readings on effective group processes and websites discussing PBL. Students had the opportunity to ask questions regarding the PBL procedures. It was also made clear to them that they could ask for assistance if needed.

The Tutorial Process

Before the initiation of the PBL activity in the classroom, the facilitator randomly assigned the students to tutorial groups. A heterogeneous group consisted of four or five male and female participants. Different group members acted as leaders, recorders, time-keepers, and readers of the problem. The tutor explained the process, defined assessment, and made the intended learning outcomes of the implementation of PBL in the geography modules known.

The first-year geography education students had six weeks to formulate solutions to the stated problems in the respective modules (Table 1). During the six weeks period, they attended twelve scheduled 90-minute tutorial to assimilate information and undertake group work in order to present solutions to the problems. During the tutorials, students had to give feedback to keep track of any progress made toward possible solutions.

Tutor Training

Literature highlights the importance of tutors as a key factor in assisting and supporting students in self-directed learning environments such as PBL (Das, Mpofu, Hasan, & Stewart, 2002; Groves, 2005; Maudsley, 1999; Tick, 2000). For most of the fourth-year students this was a first encounter with acting as tutors in the PBL tutorial sessions. They received training in the fourth-year subject didactic module in the form of a three-hour workshop about the role of tutors in PBL tutorials.

Table 1. *PBL Experiences in Geography Education Modules in the B. Ed Program*

Geography modules	First semester	Second semester
First year	GEOE111: Introduction to Africa and South Africa. PBL experience: <i>“Municipalities in South Africa have been hit by service delivery protests over water shortages. A few people were killed, allegedly at the hands of police (News24). Water supply by municipalities in South Africa is a basic service that must be provided to the urban residents. Municipalities country-wide experience problems to properly render this basic service. Provide possible strategies and guidelines to municipalities and households in using water more wisely”.</i>	GEOE121: Planetary Geography, Climatology and Oceanography. PBL experience: <i>“Social constructivist approach to learning has implications for teaching Geography topics such as insulation differences on earth, origin of seasons and time differences and calculations on time on earth to first-year students”. Assist the lecturer in planning learner-centered activities for abovementioned Geography topics.”</i>

In the geography subject didactic module, focus was also placed on the following themes: active learning, learner-centered teaching, cooperative learning, and different assessment strategies. The tutors had to work through various articles and pay special attention to tutors’ facilitation skills. Special reference was made to Azer’s (2005) discussion of challenges facing PBL tutors and suggestions for successful facilitation. Causes of poor group interactions, group dysfunction, and associated symptoms were specifically discussed with the tutors (Azer, 2005).

Data Collection

The students completed Guglielmino’s (1977) Self-Directed Learning Readiness Scale (SDLRS) at the beginning of the PBL experience and again six weeks later, at the end of the PBL experience. They also responded to the 10-item PBL questionnaire at the end of the intervention.

Data Analysis and Results

SDL Readiness Pre- Post-Test Comparisons

Paired samples *t*-tests were conducted to compare the scores on the SDLRS before and after integrated PBL experiences. The results were not statistically significant; the

overall pre/post comparison (students and tutors combined) in this exploratory study yielded a *p* value of .05 (Table 2).

Table 2. *First-year Geography Education Students' and Student Tutors' Pre-Test and Post-Test SDLRS Scores*

	SDLRS Pre-test		SDLRS Post-test		<i>t</i>	<i>P</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Geography students (<i>n</i> = 72)	208.91	23.04	211.75	24.79	-1.37	.18
Geography student tutors (<i>n</i> = 23)	212.22	20.67	217.91	23.86	-1.64	.12
Total (<i>N</i> = 95)	209.72	22.43	213.24	24.58	-1.98	.05

Male and Female Students' and Student Tutors' Perceptions of Their Readiness for SDL Before and After Implementation of PBL Activities

None of the changes in SDLRS scores broken down by gender reached statistical significance. The results for this section are reported only in terms of numerical differences. The female students and tutors in the pre-test had slightly higher mean SDL scores in comparison with their male counterparts. In the pre-test the female student tutors had the highest average SDL scores of 216.3, while the male student tutors had the lowest average SDL scores (204.5) of all the groups (Table 3). The female tutors and female first-year students had the highest average increases from pre-test to post-test SDL scores of 9 points and 4.69 points respectively. The male students' and tutors' post-test scores were essentially unchanged.

Table 3. *Geography Education Students' and Tutors' Pre- and Post-test SDLRS Scores by Gender*

	Gender	SDRLS Pre-test		SDLRS Post-test		<u>Change</u>
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Students	Male (<i>n</i> = 27)	206.41	23.80	206.60	22.60	+ 0.19
	Female (<i>n</i> = 45)	210.42	22.71	215.11	25.66	+ 4.69
Tutors	Male (<i>n</i> = 8)	204.50	19.58	204.00	20.10	- 0.50
	Female (<i>n</i> = 15)	216.33	20.68	225.33	22.86	+ 9.00

Students' Perceptions of PBL and the Support and Functioning of Group Members in PBL Tutorials

The students' perceptions of PBL as a teaching and learning strategy (Section A) and the functioning and the support of group members in PBL tutorials (Section B) were determined by the researcher-constructed questionnaire. Means were calculated for each item; then relationships between the two section total means and relations of each with post-test SDL scores were explored using Spearman's rho. In Section A, *PBL As a Teaching and Learning Strategy*, the average score of all five items (*M* = 3.29)

indicated that the students were moderately positive about PBL as a teaching and learning strategy. No item in this section received an average score above 4. The highest scoring item, “*The focus on real problems made the PBL learning experiences more relevant and interesting*” ($M = 3.64$), gives an indication that the students valued the idea of solving real geography problems. However, the item, “*I understood the specific themes (learning content) in the PBL activities better than if it had been lectured in the conventional way*” ($M = 2.96$), received the lowest score. It is clear that the first-year geography education students are not yet convinced that PBL as a teaching and learning strategy is a better option than lecturing in gaining meaning (Table 4).

In Section B, on students’ perceptions on the functioning and support of group members in PBL tutorial sessions, the mean score was 3.64 (Table 4). The highest scoring item in this section, “*Group members exhibited respect and understanding for one another’s opinions and views*” ($M = 3.98$), indicated that most of the group members in a collaborative learning environment listened to each other’s views. A worrying aspect is that the item, “*All group members were well prepared for the tutorial sessions*” ($M = 3.20$, $SD = 1.21$), received the lowest mean score. When students are not well-prepared for group work, that can hamper the effective implementation of PBL and cause negative student perceptions of PBL.

Table 4. *Students’ Perceptions of PBL and the Functioning of Group Members during the PBL Tutorial Sessions*

PBL As a Teaching and Learning Strategy	<i>M</i>	<i>SD</i>
The focus on real problems made the PBL learning experiences more relevant and interesting.	3.64	0.98
I have enjoyed the PBL experiences in the Geography modules.	3.34	1.10
PBL motivates me to learn.	3.25	1.03
PBL activities should definitely be integrated in the other Geography modules.	3.25	1.21
I understood the specific themes (learning content) in the PBL activities better than if it had been lectured in the conventional way.	2.96	0.98
<i>Overall Average</i>	3.29	0.82
Support and Functioning of Group Members in PBL Tutorials		
Group members exhibited respect and understanding for one another’s opinions and views.	3.98	1.09
The PBL activities helped me to foster good interpersonal relationships with my fellow students.	3.82	1.04
Group members helped me to understand the necessary concepts, ideas and study content towards the problem solution.	3.62	1.17
All group members reached out to one another in order to build group spirit.	3.58	1.14
All group members were well prepared for the tutorial sessions.	3.20	1.21
<i>Overall Average</i>	3.64	0.93

1 = low level of agreement; 5 = high level of agreement

Relation Between Students' Perceptions of PBL, the Functioning and Support of Group Members in PBL, and Their Readiness for SDL after Intervention

The relations between students' perceptions of PBL, the functioning and support of group members in PBL tutorials and the students' perceptions of their readiness in the post-test SDL were calculated using Spearman's correlation coefficient. There was a small-to-moderate positive correlation ($r = .238, p < .05$) between students' perceptions of PBL and their perceptions of their readiness for SDL after intervention (Cohen, 1988). In other words, students who had positive perceptions of PBL as a teaching and learning strategy also had higher perceptions of their readiness for SDL after the PBL intervention. There was a strong positive correlation ($r = .635; p < .01$) between the students' perceptions of PBL and the functioning and support of group members in the PBL tutorial sessions, but no significant correlation was found between students' perceptions of the support and functioning of group members in PBL tutorials and their SDL scores after the intervention.

Discussion

In the literature PBL has been identified as one of the important teaching and learning strategies that offers potential to encourage students to take responsibility for their own learning. The findings in this study reflect that there were no real differences between the first-year geography students' and the fourth-year student tutors' SDL scores, indicating no increase in SDL readiness during the traditional four-year program. These findings concur with Golightly and Brockett (2010), who in 2009 at the same university found that there was no significant difference between first-year and fourth-year student teachers' perceptions of their SDL.

After implementation of PBL activities in the first-year geography modules for six weeks (last three weeks of the first semester and first three weeks of the second semester), no significant difference was documented in the geography students' and tutors' perceptions of their readiness for SDL. Assuming an alpha level of .05, the p value of .05 is not statistically significant. Despite the fact that there was no significant increase, this intervention shows promise in light of other literature findings. In Walker and Lofton's (2003) study the students showed a statistically significant decline in their perceived ability to perform SDL after their first PBL experiences. Harvey (2003) also found no evidence that the hybrid PBL influenced students' self-reported SDL positively. In other studies the implementation of a PBL curriculum (over a long period of time) produced mixed results. Hmelo and Lin (2000) and Kivela and Kivela (2005) reported evidence that PBL fosters SDL, while Lloyd-Jones and Hak (2004) did not find that PBL fostered SDL in their study.

In attempting to understand these results, it is important to remember that this intervention is a first encounter with PBL for both the teacher education students and tutors and that this new learning environment, where the students take more responsibility for their own learning, can be overwhelming for most of them, as they have experienced primarily didactic instruction previously. The researchers also

examined the geography education students' perceptions and experiences of PBL as a teaching and learning strategy, and it is clear that they still prefer the traditional direct instruction above PBL. This result supports the view of Miller and Schwartz (2000), who state that students have a difficult time with the transition from lecture-based learning to PBL. Walker and Lofton (2003) mention that the introduction to the PBL curriculum can initially negatively influence students' perceptions of their SDL ability. Posner's (1990, 1991) research on project-based learning also reported an initial decline in students' perceived readiness for SDL, but a slightly higher level of readiness among those who had completed a first SDL project and a much higher level of readiness for those who had completed a second SDL project.

Contrary to results of some of the other studies, however, there was no overall decrease in readiness for self-directed learning in this study. The pre-test and post-test SDL scores for the male students and tutors remained essentially the same, while there was a slight positive numerical increase in the scores of the female tutors and students (but not at the level of significance). It will be important to investigate whether there is any increase in self-directed learning readiness over a three-year period with an integrated PBL format in the geography modules. It will also be interesting to examine the gender issue over a longer period of time and with a larger sample. Studies in nursing (Klunklin, Visekul, Sripusanapan, & Turale, 2010) and mechanical and electrical engineering (Litzinger, Wise, Lee, & Bjorklund, 2003) reported no gender differences in students' readiness for self-directed learning.

The researchers believe that a possible reason why the students in this study did not experience a decline in their SDL scores with the integrated PBL format is that care was taken to provide transition structures from the didactic to the PBL experience. The planned workshop at the beginning of the PBL experiences with both students and tutors provided an orientation by identifying their roles in PBL and SDL. In addition, each PBL group had its own student tutor to assist and support the group's students in the induction process of PBL.

Regan (2005) points out that the facilitation of self-direction in learning is a process that is developed over time and may have a level of variability, depending on the context in which the learning takes place. Lunyk-Child, et al. (2001) report that students undergo a transformation that begins with negative feelings but ends with confidence and skills in self-directed learning. During this time the learning facilitators have to ensure that students receive enough support in the new learning environment.

In this study there is a positive correlation between students' perceptions of PBL as a teaching and learning strategy and their perceptions of their readiness for SDL at the end of the PBL intervention. That connection would be logically expected. Those with higher levels of readiness for SDL would be more prepared to face the challenges of PBL and therefore have a more positive perception of the process.

Conclusions

The students and tutors in this study evaluated their readiness for SDL as average. There was no significant difference in the SDLRS scores of the first year students and the scores of the fourth year tutors, who had been taught through traditional instructional

methods. Although improvement in students' perceived readiness in SDL after the implementation of PBL activities did not achieve the level of statistical significance in this exploratory study, neither did they decline, as has been the case in some other studies of the initial implementation of more self-directed learning approaches (for example, Miller & Schwartz, 2000; Posner, 1990, 1991; Walker & Lofton, 2003). The researchers hypothesize that the careful attention given to transition and support structures (the orientation sessions and the student tutors) may have prevented a decline despite the dramatic change posed by the PBL approach in contrast to the didactic structure the students had previously experienced. We therefore recommend that the transitional structures continue to be used.

The literature indicates that SDL skills develop over time (Lunyk-Child et al., 2001; Regan, 2005; among others). It also clearly indicates that most of the evidence supporting PBL as a way of fostering SDL has been reported from studies using a "pure" PBL model rather than the integrated model used in this study. Given the context of this study, with first-year college students coming from a highly didactic educational experience, as well as the academic constraints, immediate implementation of a pure PBL model would have been unwise. Research and writings by Dynan, Cate, and Rhee (2008), Grow (1991), and Wiley (1983) indicate that better results are achieved in promoting self-directed learning when learners are not faced with a dramatic change, but have the opportunity to gradually move toward a more self-directed approach.

The authors concur with Shaik (2013), who asserts that the inculcation of the SDL skill building should be present from the beginning of professional preparation programs; but we also caution that transition structures must be a strong consideration in the instructional design. An integrated PBL model such as the one used in this study provides a starting point for the development of the skills and attitudes of SDL without creating high levels of anxiety. The orientation sessions and consultation with tutors provide transition structures that can assist in students' adjustment to taking more responsibility for their own learning.

Further investigations over a longer period of time are needed for a clearer understanding of the specific effect that integrated PBL formats may have on the teacher education students' perceptions of their readiness for SDL. Geography classes appear to be a promising setting for continued investigation of the potential of PBL formats for increasing SDL readiness over time, therefore better preparing students for lifelong, self-directed learning.

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