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Empirical Study: Mentorship as a Value Proposition (MVP)

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Abstract
Greater access to college education, owed in part to technology and globalization, increases opportunities for students to prepare and thrive professionally. Undergraduate education must offer pedagogies of engagement to meet needs of the competitive global workforce and post-baccalaureate programs requiring advanced research and analytical skills. Many universities and colleges recognize the critical need for undergraduate engagement in research and participation in professional world experiences to cultivate aptitudes required in the 21st century. Using a triangulation inquiry methodology, this empirical study contributes to the research on undergraduate research mentorship pedagogy by assessing its merits operationalized across multiple disciplines at a public liberal arts university. Findings support the added value of the pedagogy in its capacity to optimize marketable aptitudes. The study presents participants' unique voices, as their perceptions are significant in identifying the value-added by this pedagogy.

Keywords
mentorship, mentoring pedagogy, self-efficacy, undergraduate research, mentoring third space

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Empirical Study: Mentorship as a Value Proposition (MVP)

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Greater access to college education, owed in part to technology and globalization, increases opportunities for students to prepare and thrive professionally. Undergraduate education must offer pedagogies of engagement to meet needs of the competitive global workforce and post-baccalaureate programs requiring advanced research and analytical skills. Many universities and colleges recognize the critical need for undergraduate engagement in research and participation in professional world experiences to cultivate aptitudes required in the 21st century. Using a triangulation inquiry methodology, this empirical study contributes to the research on undergraduate research mentorship pedagogy by assessing its merits operationalized across multiple disciplines at a public liberal arts university. Findings support the added value of the pedagogy in its capacity to optimize marketable aptitudes. The study presents participants' unique voices, as their perceptions are significant in identifying the value-added by this pedagogy.

INTRODUCTION

This empirical study investigates the mentoring of students in undergraduate research as a value proposition for undergraduate programs in order to enable universities and colleges to produce highly competitive students to enter graduate schools and professional careers. The mentorships measured in this study occur across multiple disciplines at a small public liberal arts university. This paper addresses the impact of third space undergraduate research mentoring relationships on students' future successes in their professional lives. The mentoring third space (Richards, Powell, Hammack, McMullen, Bacnik, Lewis, & Sams, 2014) "is the location where the mentee and mentor become partners and where the integration of knowledge moves the undergraduate into the community of practice where optimized academic dispositions are attained" (p. 11).

Mentored undergraduate research is defined as, "undergraduate student engagement in authentic research conducted under the direct supervision of faculty researchers" (Seymour, Hunter, Laursen & DeAntoni, 2004). For the purpose of this study, the mentorship value proposition combines the faculty mentor's expertise and experience into a customized mentoring relationship with an undergraduate mentee in exchange for the growth and development of the mentee's aptitudes. These aptitudes are sought after in the marketplace (i.e., graduate programs, and employers) and value is increased for all stakeholders: the mentee attains a competitive advantage, the mentor's expertise is advanced – gained through the mentor-mentee collaboration, and the marketplace benefits from gains in the mentee's skills and dispositions.

Participants' perceptions are important in identifying the authentic value of the mentorship pedagogy, because these perceptions hold insight into its effectiveness. Through a triangulation of studies that individually and collectively evaluate the value-added to the mentee, this investigation gives voice to the mentees' experiences. Consequently, it is exploratory in nature and the survey questions posed herein seek to uncover the nature of this pedagogical approach.

LITERATURE REVIEW

The literature review of undergraduate research mentoring, addresses three objectives. These include: (1) preparing students for the workforce, (2) closing the gap of unqualified workers, and (3) the role of faculty members in the mentoring relationship. The literature also introduces the Third Space, a model for mentee development.

Objective 1: Preparing Students for the Workforce

Although access to higher education is greater than in the past, college educational offerings must transform to produce individuals with sophisticated skills to meet the workforce requirements of a rapidly changing global economy.

> "The strength of the American economy is inextricably linked to the strength of America's education system. Now more than ever, the American economy needs a workforce that is skilled, adaptable, creative, and equipped for success in the global marketplace" (Whitehouse.gov, 2012).

According to recent reports by the Chronicle of Higher Education (Fisher, 2013), employers are relatively content with students' technical readiness, but prefer experience over academic record. This is also supported by a separate study where companies identified student participation in internships as critical to employability (Schwabel, 2012). At the same time, most employers are concerned that universities are not adequately preparing students to communicate well, make effective decisions, think critically, find and evaluate options, and draw sound conclusions (Fisher, 2013). What employers expect from college graduates (see "Framework" – P21, 2015) requires a mastery of skills and dispositions including STEM-fluency. Since employers expect students to be well versed in these skills, this passes the responsibility of workforce development to universities. According to TeachingChannel.org (2016), in order to excel from an internship experience, quality mentoring is needed. Mentoring of undergraduates whether in apprenticeships, internships, or research is proposed as a key component in the development of a highly skilled workforce.

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Objective 2: Closing the Gap of Unqualified Workers

The challenge to higher education is not new. In 1998, the landmark Boyer Commission Report called for a "reinvented undergraduate education" to equip and prepare U.S. students to matriculate through robust post-baccalaureate degree programs and succeed in a complex, competitive 21st century workforce (Smith, 2004). The Boyer Report (1998) responded to the dire status of higher education, which tacitly has forced the U.S. to seek expertise from other countries. According to a 2010 College Board Report, the U.S. ranks 12th among 36 developed countries in its share of adults ages 25 to 34 with a college degree (O'Shaughnessy, 2012). In fact, a Congressional bill was recently passed that would boost the number of visas and green cards to highly-skilled foreign nationals (Federation for American Immigration Reform, 2013), signaling high demand by U.S. companies for the world's best talent to fill the gap created by a low level of competency within U.S. domestic labor force. Barring any unforeseen economic surprises, a guarded approach to hiring in the U.S. continues to be status quo as the economy continues on a path of slow growth (Careerbuilder, 2013). Therefore, a viable pool of graduates must be produced by higher education with the requisite knowledge, skills, and dispositions to persist in rigorous graduate programs and compete in the global marketplace.

To address this gap, colleges and universities offer targeted opportunities, such as undergraduate research, for students to engage in experiences that develop or enhance the skill sets necessary for them to compete (Craney, Mckay, Mazzeo, Morris, Prigodich & de Groot, 2011; Laursen, Hunter, Seymour, Thiry, & Melton 2010; Russell, Hancock & McCullough, 2007). In 2005, the Council of Undergraduate Research and the National Conference on Undergraduate Research issued a joint statement acknowledging undergraduate research as "the pedagogy for the 21st century" where an inquiry-based model is nurtured within a collaborative enterprise between mentee and mentor. Lopatto (2010) and others (Hathaway, Nagda & Gregerman, 2002) underscored also the critical role that mentorship plays in producing a combination of deep student learning, persistence in college, skill development, dispositional gains, and career clarification. Such transformative, value-added outcomes of faculty-student collaboration can be directly mapped to the elements identified in the "Top Ten" list of what employers desire from college graduates (Webb, 2007), uniquely positioning undergraduate research as a high-impact pedagogy with benefits to both academia (Kuh, 2008) and the world of work (Crowe & Brakke, 2008).

In general, students engaged in research described that a personal relationship with their mentor was the most important element of the research experience, affording a range of support from expertise to emotional (Cox & Andriot, 2009; Falconer & Holcomb, 2008). Shellito, Shea, Weissmann, Mueller-Solger & Davis (2001) identified 13 characteristics (i.e., develop well-defined projects in line with students interests and abilities in mind, recognize student time commitment outside the lab, commit ample supplies and equipment, understand and communicate mutual expectations, spend time with students, know students as individuals, give positive constructive feedback and encouragement, be approachable and encouraging, respect students as colleagues, progress toward student independence, encourage presentation and/or publication, offer career guidance, provide continued mentorship) of successful research mentorships from faculty mentor interviews, many of which focused on interpersonal relationships. The investigation of Shellito et al. (2001) highlighted also an important observation – almost two-thirds of students surveyed preferred faculty mentors over graduate students and postdoctoral mentors. Results from these and other investigations (Gafney, 2005) suggest the need for rich relationship pedagogy by faculty mentors designed around key elements to optimize value-added to the experience. Of these 13 Shellito, et al. (2001) characteristics, seven (7) were measured in the current study (Table #1).

TABLE 1. Thirteen Characteristics Successful Research Mentorships

Characteristics Measured in Current Study	Part of Current Study
Be approachable and encouraging	N/A
Commit ample supplies and equipment	N/A
Develop well-defined projects in line with students interests and abilities in mind	Yes
Encourage presentation and/or publication	Yes
Give positive constructive feedback and encouragement	N/A
Know your students as individuals	Yes
Offer career guidance	Yes
Progress toward student independence	N/A
Provide continued mentorship	Yes
Recognize student time commitment outside the lab	N/A
Respect students as colleagues	Yes
Spend time with your students	Yes
Understand and communicate mutual expectations	N/A

Full listing of quantitative and qualitative questions are available from the contact author.

Objective 3: Structural Considerations

Yet, very few studies reveal the nature of this pedagogy of engagement (Brew, 2013; Malachowski, 1996; Shellito, et al., 2001). Even fewer point to learning theories on mentoring undergraduates through research (Brown, Daly, & Leong, 2009) despite mounting evidence that an effective mentoring relationship between faculty and an undergraduate student builds a vital bridge between the traditional classroom and the preparation experience that graduate schools, corporations, businesses, and industry demand (Crowe & Brakke, 2008; Kuh, 2008). One reason for this gap is that the structure of higher education confounds the promotion of learning outcomes that help students develop complex capacities critical to thriving in a highly demanding global context. For example, it is not always feasible to facilitate learning through both classroom and engaged experiences. Workloads do not always allow for establishing apprenticeships (i.e., a state or condition of learning from a master in a field) (vocabulary.com 2016); however, some faculty members manage to engage their students despite structural and institutional barriers. Hensel & Paul (2012) argue that these barriers create issues for tenure, promotion, and retention. Consequently, research mentorship remains for many an undervalued pedagogy in the undergraduate curriculum, presenting a significant challenge to higher education on whether or how to place value (Malachowski, 1992). This is especially true around issues of faculty workload, tenure, promotion, and retention (Hensel & Paul, 2012).

Colleges and universities must formalize, promote, support, and assess undergraduate research in order to add significantly to the value of students' educational experience (Kuh, 2008).

National organizations (Council of Undergraduate Research [CUR], 2011; Project Kaleidoscope - Association of American Colleges and Universities [AAC&U], 2012; The Boyer Commission, 1998) have long advocated for higher education to engage undergraduate students in research. As a result, undergraduate research as a high-impact practice has gained momentum in particularly in the science, technology, engineering, and mathematics (STEM) disciplines (Osborn & Karukstis, 2009; Egan, Sharkness, Hurtado, Mosquedo & Chang, 2011; Hunter, Laursen & Seymour, 2007; Laursen, et al., 2010). For example, a longitudinal study published in 2012 investigated developmental outcomes (personal, professional, and cognitive) of 73 STEM students engaged in research across four different undergraduate research programs at two research-intensive universities. Using qualitative and quantitative methodologies, the study demonstrated that the more interactions the students had with their research and mentors, the greater the gains were in research process knowledge and dispositions required to become a scientists (Thiry, Weston, Laursen & Hunter, 2012). Lopatto (2007) tested the reliability of student evaluations of summer undergraduate research using the Survey of Undergraduate Research Experience (SURE). The study showed that research involvement enhanced the educational experience of science students, attracted and retained students to careers in science, and provided a pathways for students of color into science careers. Ishiyama's study (2007) supported Lopatto's findings on under-represented student perceptions of research mentoring. The study concluded that most underrepresented students emphasized psychological benefits and clarification of their career paths while Caucasian students emphasized understanding the research process and its ability to enhance their professional or academic credentials. For the STEM disciplines, the value-adding dimensions of faculty-student mentorships are well-supported.

Much of the literature on mentoring undergraduate students through research has focused on STEM. However, reports on value added to mentored students from professional schools, social sciences, and humanities are scarce (Craney, et al., 2011; Russell, et al., 2007). Despite the limited number of investigations in non-STEM disciplines, there is general agreement that undergraduate research develops the STEM capabilities of the student. In a 2003 study, Bauer and Bennett surveyed 986 alumni from a research-intensive university and found that students experienced "greater enhancement of important cognitive and personal skills and higher satisfaction with their undergraduate education" (p. 225) than those with no research experience. In another study by Russell, et al. (2007), greater than 7,000 STEM, social and behavioral sciences students were surveyed. Over half of the sample surveyed had experienced undergraduate research. Interestingly, findings revealed that early exposure to undergraduate research led to a clarity of interest in the science disciplines as well as the development of a higher level of understanding of scientific methodologies. Similar conclusions were drawn from the National Survey of Student Engagement (NSSE, 2007) data, collected from 2,674 students from a variety of majors. Results indicated a combination of learning gains, social, and professional development.

Formulation of Research Questions

While much of the past research has focused on student outcomes in STEM, the current empirical study contributes to the undergraduate research literature on mentoring across multiple disciplines by assessing the merits of the mentorship pedagogy. The study investigates the value-added proposition by the mentorship strategy to the mentee's undergraduate educational experience, post-baccalaureate aspirations, and self-efficacy. Using a scaffolding triangulation model to measure the value of this relationship strategy in optimizing aptitudes sought after in a global marketplace, the study gives voice to senior students and alumni that participated in a proposed third space relationship pedagogy.

Third Space Mentoring. Research suggests that successfully mentored experiences traditionally engage students in a developmental dimension of learning or "zone of proximal development" (Vygotsky, 1978) where a rich mixture of professional and personal development occurs (CUR & NCUR, 2005). At the outer edge of this zone, students begin constructing awareness of signature skills and dispositions as a result of observation. Through exploration of inner intellect and shared knowledge mentees transition into the mentoring third space where self-efficacy increases and metacognition is heightened (Richards, et al., 2014).

> "As a result of blurring boundaries between activities, what might be described as third space has emerged between professional and academic domains" (Whitchurch, 2008, p. 384).

The effective mentor nurtures self-directed learning so that the undergraduate begins to equip him or herself with the characteristic competencies of the discipline or field. In this dynamic, the expert mentor exceeds the undergraduate's ability to contextualize knowledge. Over time, the mentorship supports or scaffolds what the undergraduate student cannot accomplish without guidance. One school of thought treats expertise gained as cognitive (Brown & Cocking, 2000) while another proposes that expertise may also include self-authorship (Magolda & King, 2004) or "the acquisition of independent thought and the motivation to pursue new regions of knowledge based on a belief about the value of that knowledge" (Lopatto, 2004).

For the purpose of this study, the mentoring third space (see Figure #1 below) is defined as the place where the mentee and mentor engage in relationship pedagogy to pursue new regions of knowledge – that is, both professional knowledge and self-knowledge (Richards, et al., 2014). The third space is hypothesized and measured as the place where the integration of knowledge moves the undergraduate into the community of practice where academic and professional attributes are attained and social dispositions, beliefs, and aspirations can be optimized.

For example, many teacher-preparation mentors often embed research within their coursework and eventually their communities of practice known as P-12 classrooms. Before student teaching full time, teacher candidates complete positive behavioral interventions and supports (PBIS) projects in their lab schools as one of the requirements in the Classroom Management course. With guidance, candidates investigate problematic behaviors by collecting data on challenging behaviors, determining the effectiveness of interventions, and employing evidence-based practices. Over time,

this mentored research helps candidates independently monitor problematic behaviors and implement effective strategies during full-time student teaching. Candidates move from the basic entry of guided investigations into the mentored third space of displaying the integration of behavioral knowledge in their communities of practice.

FIGURE 1: Mentoring Third Space

The influence of the pedagogical experience to enhance post-baccalaureate aspiration was measured by Colucci-Rios and Briano (2001). Their Sloan Program involved mentored undergraduate research among other learning experiences targeted primarily to science majors. As to mentored undergraduate research, the Colucci-Rios and Briano (2001) study demonstrated that students engaged in mentored undergraduate research exhibited an increase in technical decision-making and the ability to resolve complex problems within a team environment. Most of the mentees surveyed in the study joined a graduate program. The research presented herein extends the Colucci-Rios and Briano (2001) study by exploring the influence of the mentorship on graduate school or career decisions. However, the current study differs in that it focuses on the value added by the relationship of the mentee/mentor collaboration within the proposed third space, whether the mentorship was one-on-one or within a group.

> R1: Do mentees perceive that undergraduate research mentoring relationships add value their degrees within the third space by influencing graduate school decisions?

Without the broad transferable skills to tackle capacious problems in science technology, medicine, climate, environment, culture, and globalization, college graduates across the globe are entering the workforce underprepared. Undergraduate research provides a better educational experience for students (Wilson, 2000) and prepares them to be "better informed citizens and critical consumers of research" (Stocks, Ramey & Lazarus, 2004). In addition to highly desirable interpersonal skills (Sleigh & Ritzer, 2004), productive dispositions such as persistence, self-reliance, self-worth, sense making, independence, and leadership are essential for career sustainability, marketability, and competitiveness. The mentorship pedagogy proposed herein provides opportunities for the mentee to develop desirable academic, social and professional skills. Empowered by developing expertise, the mentee's confidence levels increase as well as belief in his or her ability to succeed. Consequently, self-efficacy increases, driving even greater achievement of highly desirable workforce aptitudes and competencies.

> R2: From the mentees' perspectives do undergraduate research mentoring relationships add value to students' degrees within the third space by better preparing them for careers?

Self-Efficacy. Self-efficacy, as defined by Bandura (1994) is, "an individual's belief in his or her ability to successfully perform a task and affect change in similar future situations through mastery" (p. 71). Pajares (1997) concluded that, "self-perceptions of capability determine what individuals do with the knowledge and skills they have…self-efficacy beliefs are critical determinants of how well knowledge and skill are acquired in the first place" (p. 2). Self-efficacy is a key to success in human achievement. Self-efficacy has been shown to be vital to college students' success in grade point average and retention in college. Affirmation and encouragement by valued others (e.g., professors) is also expected to increase self-efficacy regardless of previous experience (Sams & Sams, 2011). By its very nature, mentorship involves verbal persuasion, genuine praise from respected others, and demonstrated successes are expected to increase an individual's self-efficacy as those with high self-efficacy see obstacles as challenges and not threats (Bandura, 1993; Parjares & Bengston, 1995). Further, it is expected that an undergraduate research mentorship will positively affect upper level undergraduate students' identity and cognitive development (Holley & Taylor, 2009).

STEM-fluency. STEM-fluency refers to an individual's ease with investigating and thinking through information to draw sound conclusions to a question or a problem within an interdisciplinary context. In other words, this individual is not necessarily a science, technology, engineering, or math major, but is also one from non-STEM disciplines. STEM-fluent citizens are equipped with the ability to think and function scientifically – behaviors that embrace core competencies such as persistence, deductive reasoning, process/problem-solving skills, and strong work values (Carnevale, Smith & Melton, 2011). Consistently, K-12 and higher education aim to prepare graduates possessing these competencies. Likewise, 138 employers recently expressed the greatest confidence in college practices where students acquire hands-on or direct experiences with the methods of science that develop core cognitive competencies to help students succeed beyond graduation (Hart Research Associates, 2013).

> R3: Do mentees perceive that the mentorship relationship increase is greater for either self-efficacy or for STEM-fluency?

"Self-perceptions of capability determine what individuals do with the knowledge and skills they have … self-efficacy beliefs are critical determinants of how well knowledge and skill are acquired in the first place" (Pajares, 1997). From social-identity the-

ory, self-identity and communicated objectives form a public identity wherein aspirational others influence self-efficacy (Sherwood, 1965; Zimmerman, 2000). In other words, those successfully presenting in front of members of their aspirational groups (e.g., academics or practitioners) where they receive feedback are expected to hold higher levels of self-efficacy than those who do not present. In a qualitative study conducted by Searight, Ratwi, and Smith (2010), one finding relevant to this current study was that respondents found that being placed in a professional role was extremely valuable. The respondents reported that presenting at conferences was a significant confidence builder. Therefore, mentorships that offer opportunities for students to showcase their work equips the mentees with high levels of self-efficacy. Another significant finding from the study was a sense of ownership of the work and individuality – "…participants did not see the common practice of working in teams on faculty mentored research to be particularly attractive. It was seen as eliminating the freedom to pursue their unique interests" (p. 110).

R4: Do mentees who present their research to aspirational groups where feedback is given hold higher levels of self-efficacy than mentees who do not present to aspirational groups?

METHODOLOGY

Research Design

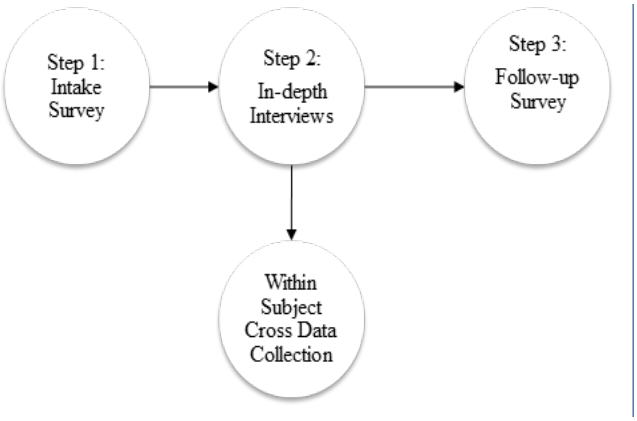
This mixed-methods study investigated mentees' perceptions of benefits from (a) engagements in undergraduate research mentorships, (b) perceptions of mentor roles, (c) influences of mentorships on careers and/or graduate school choices, (d) value added to undergraduate degrees, and (e) self-efficacy and STEM-fluency.

The study was undertaken by a team of faculty at a small public liberal arts university located in the southeastern U.S. The teaching circle of faculty members was interested in exploring and applying best practice strategies for effective faculty-student mentoring in undergraduate research towards developing faculty careers that include undergraduates as researchers. When the study began, the institution had no formal mentorship program in place for undergraduate research. Besides courses that engaged groups of students in research, individual student mentorship and research group mentorships were conducted by most faculty outside of their formal workload, demonstrating faculty members' dedication to the student learning process. At the data collection stage of this study, the university hired the first director of Undergraduate Research and Creative Endeavors (URACE) who began the process of formalizing mentorship opportunities at the institution. Data for this study were collected on students and alumni who were mentored prior to formalizing the URACE initiative. In essence, faculty voluntarily engaged in mentorships without formal direction or university support in an effort to add value to their students' educational experience.

Mixed Methodology Data Collection (Scaffolding Triangulation Model)

An in-depth phenomenological triangulation technique (three-step series) was adapted from Seidman (2006) for which responses to concepts in the study build on each other across the study timeframe (see Figure #2 below). This study examined the hypothesized relationship through a triangulation process of data collection that included 1) an in-take survey that collected data on life history during the mentoring process, 2) a follow-up survey (exit survey) that collected reflective thoughts and self-efficacy, and 3) separate semi-structured interview protocol that collected data on realities and viewpoints of the learning experience from undergraduate students who were part of a mentorship within the past five years.

FIGURE 2: Scaffolding Triangulation Methodology



The combined data informed findings from participants' perceptions of outcomes of the mentoring relationship nurtured within the proposed third space. To determine the level of gains from the mentoring experience, the researchers compared these findings to the number of mentorships that participants had experienced together with the mentorship disciplines. The quantitative data informed the "what" of the mentorship while the qualitative informed the "why" or "how" of the participants' lived experiences (Anderson-Levitt, 2006). Beyond addressing the hypotheses, findings of the study allowed the researchers to identify behavior patterns and mentorship meanings that have potential to inform effective mentoring practice.

Quantitative Methods (steps 1 and 3). The first step of the quantitative process involved a 23-item intake questionnaire. The questionnaire was an online, self-report survey designed to obtain important data to build an informed conversation in the second step of the process (in-depth interview). For example, demographic information such as academic standing, college major, the timeframe within which student began the mentoring process, reasons for becoming a mentee, aspirations for graduate school or career path, etc. The third step involved an online, self-report follow-up survey of 27 scale items that collected outcome data after the interview was completed. The follow-up survey was designed as a separate instrument from the intake survey so that data collection would not create bias during the interview (step 2). The survey examined the perceived value of the mentoring process through a four-item Likert-type scale with endpoints of 1= totally disagree – 6 = totally agree, with an option for not sure. Scale item example was "added value to my degree". A perception of increase in STEM-fluency from the mentoring process was measured with a six-item Likert-type scale with endpoints of 1 = none I was already proficient in this to 5 = increased significantly, with two additional options (not sure and not relevant to my mentorship). A scale item example is "how data can be used to solve complex problems". The survey also included a 17-item self-efficacy scale (Sams & Sams, 2011) with endpoints of 1 = not at all to 6 = extensively, with an additional option for not sure. Examples of scale items are

the "ability to organize thoughts," "critical thinking skills," "problem solving skills". To ensure rigor, all quantitative data were subjected to statistical analyses using SPSS20® statistical software analysis. The self-report survey methodology was appropriate for this study as participants are aware of changes in their own in knowledge and value-added to their academic and professional skills within the mentoring relationships.

Qualitative Methods (step 2). An interview protocol consisting of 30 questions plus probes was designed by the research team to be exploratory in nature. The protocol used data generated by the in-take survey to inform the type of questions that were relevant. In addition, the interview protocol allowed for in-depth data collection required to construct meaning. The initial interview questions were populated with queries on the respondent's decision to engage in the mentoring process (e.g., Why did you decide to do an undergraduate mentorship(s) in research?) and the development of a professional relationship with a mentor (e.g., How do you feel that your relationship with the mentor changed over time from the first time you started working with the mentor until the end of the project or paper?). Subsequent questions focused on the operational aspect of the mentorship relationship, specifically exhibitions, performances, and/or presentations made by the interviewee (e.g., Do you feel your mentor prepared you properly for the experience?). Thereafter, questions transitioned to outcome elements including influence of the mentoring experience on graduate school and career decisions (e.g., Did the mentorship play a role in your decision to go to a graduate school?). The interview closed with questions on key success factors and value expectations of the experience (e.g., What elements of the mentorship(s) do you think were the most valuable to you?). Interviews ranged from 35 to 45 minutes and were structured to allow the respondents opportunity for reflection. Highly trained undergraduates – seniors with significant experience in research methodology through coursework and research mentorships conducted the interviews. A peer interview approach was implemented to reduce response bias (i.e., socially-desirable responding) caused by having a faculty member conduct the interviews (Steenkamp, de Jong & Baumgartner, 2009). All interviews were tape-recorded. The researchers transcribed the data verbatim and examined all data through content analysis. To analyze the interview data, the research team searched each transcript for data directly related to the research questions. Themes were coded and codes were grouped within specific domains (e.g., value-added graduate school, value-added career decisions) (Spradley, 1980). The transcripts of the audiotapes and videotapes were subjected to content analyzed by three independent reviewers using an agreed upon color-coding methodology to determine the meaning of words and phrases used by respondents, the frequency and intensity of the comments, and the observed emotion. These reviewers met to discuss findings, combined findings into specific domains, etc.

Sampling

A snowball sampling methodology was used to recruit a pool of respondents. The respondents' mentors provided names and contact information of mentees whom had experienced at least one semester of mentoring or extended mentorship (greater than one semester). The pool comprised of undergraduate seniors and alumni. A research assistant contacted potential participants by email to solicit participation. Respondents willing to participate in the study received a link via email to the in-take survey. A total of 89 potential respondents were solicited. Non-response from potential participants resulted in a second email after one week and again after two weeks. A total of 79 intake surveys were completed, four others were abandoned after the first question, and six others did not respond to the survey. The intake survey produced an 88.7% response rate. Of the 79 respondents completing the survey, 29 full interviews were completed. The low response rate was presumably due to the time involved in conducting each interview and the time constraints by both interviewer and interviewee. Upon completion of the intake survey, consent forms were sent to respondents. On receipt of consent, an interview date was confirmed. Non-responders for interview requests were contacted at least three times over a period of three weeks. Participants completing the interview process received a link via email to the follow-up survey. All 29 participants interviewed completed the follow-up survey but of that 29, four did not complete the follow-up survey in its entirety (partially completed). All data were scrubbed of items that would identify participants. From the data, the research team was able to identify recurring themes; thus, the interview process was curtailed and the follow-up survey process was initiated.

Analyses and Results

The following research questions were examined through a series of qualitative and quantitative data analyses.

> R1: Do mentees perceive that undergraduate research mentoring relationships add value to their degrees within the third space by influencing graduate school decisions?

This concept was first examined through a single item nominal scale on the intake survey [i.e., As to graduate school, I (… have completed graduate school, … am in graduate school, … am planning to attend graduate school, … do not plan to attend graduate school, … am not sure about attending graduate school)] to determine the respondents' graduate school behaviors. Of the 79 respondents to this item, 52% reported plans to attend, currently attending, or completed graduate school. Research question #1 was examined through an interview question that asked, "Did the mentorship play a role in your decision to go to graduate school? If so, how." The next step in answering the research questions was to determine how many of these 29 interviewees were among the 52% originally reporting graduate school intentions, attendance, or completion. All 29 interviewees were identified as part of the original 52% reporting positive graduate school intentions/behaviors. All interviewees identified the mentorship experience as a key to helping in their decision to attend graduate school. For example, participant #12 "the mentorship certainly helped prepare me for graduate school;" participant #15 "…cemented any doubts about doing it I might have had, it just reinforced my desire to go to law school;" participant #22 "I had planned to go...she suggested certain programs to avoid;" and participant #61 said "…in dental school thanks to my mentorship."

As part of the follow-up survey, respondents were asked to identify if the mentorship played a role in their future college

plans [i.e., My faculty/student overall mentoring experience(s) …... played a role in my future college plans measured on a Likert six-point scale (1=totally disagree to 6 = totally agree with an additional option of not sure)]. Table #2 shows that 88% of respondents agreed or totally agreed that the mentorship played a significant role in their decision to enter graduate school.

TABLE 2. Role of Mentorship Future Graduate College Plans

	Frequency	Percent	Valid Percent	Cumulative Percent
Did not Answer	1	4.0	4.0	4.0
Disagree	1	4.0	4.0	8.0
Somewhat Agree	1	4.0	4.0	12.0
Agree	6	24.0	24.0	36.0
Totally Agree	16	64.0	64.0	100.0
Total	25	100.0	100.0	

R2: Do undergraduate research mentoring relationships add value to students' degrees within the third space by better preparing them for a career?

This concept was measured by scale item #12 on the intake survey. This nominal scale collected data on the respondents' employment status [i.e., if you are gainfully employed, did a faculty/student mentorship experience play a role in your career decisions (possible responses – no, yes, am not yet gainfully employed]. Of the responses to this scale 17 of those reporting going to, in, or completed graduate school also reported being gainfully employed and reported that the mentorship played a significant role in their career decisions. Of those not gainfully employed at the time of the survey 32 reported that the mentorship played a significant role in their career decisions. Thus, overall >69% confirmed that the mentorship experience played a role in their career decision. Further evidence from the interview process was collected in comments such as: participant #2 "My Faculty Mentors played a huge role in answering personal, individual questions about my resume, unique school situations, and helping me make connections to be hired," participant #3 "…I think it was good just to learn how to interact with professional adults," participant #4 "Oh definitely … I am an administrator at an Air Force base … the paper I worked on in the mentorship was about budgeting and in my job at the base I have to deal with a lot of budgeting," participant #12, "My mentorship experiences with Professor X and with Professor Y made me aware of the possibilities and benefits of a career with the United States Civil Service," and participant #41 "Good advice makes for a good career. And for that I am eternally grateful."

R3: Do mentees perceive that mentorship-relationship increase is greater for either self-efficacy or for STEM-fluency?

In the follow-up survey, respondents' self-reported increase in self-efficacy as measured with the Sams & Sams (2011) Likert-type scale (details provided in the methodology section above). The scale measured the extent to which each respondent believed the factors, such as critical thinking skills, reading for meaning, etc., increased as a direct result of mentoring. The scale was subjected to a scale reliability test in SPSS® and was found to be highly reliable (Cronbach's alpha .879).

Table #3 below is a frequency analysis of self-reported responses to this scale (n, 25). It is evident that respondents believed that their level of self-efficacy increased "some" (32%) while the majority (68%) reported that it increased "a great deal".

TABLE 3. Self-Efficacy

	Frequency	Percent	Valid Percent	Cumulative Percent
Some	8	32.0	32.0	32.0
A Great Deal	17	68.0	68.0	68.0
Total	25	100.0	100.0	

Because undergraduate research mentoring, by its nature, involves many of the criteria of learning found in STEM disciplines, the sample responded to a six-item Likert-type scale with endpoints addressed the STEM-fluency concepts. This scale included items to measure solving complex problems, generating evidence, scientific data collection, scientific data analysis, value of valid and reliable data, and means of interpreting different types of data. This scale was highly reliable (Cronbach's alpha of .817). The findings clearly showed significant increases in levels of knowledge by the majority (80%) of the respondents (see Table #4 for details).

TABLE 4. STEM-fluency

	Frequency	Percent	Valid Percent	Cumulative Percent
No, Already Proficient	1	4.0	4.0	4.0
Somewhat Increased	2	8.0	8.0	12.0
Increased Measurably	8	32.0	32.0	44.0
Increased Significantly	10	40.0	40.0	84.0
Not Sure	1	4.0	4.0	88.0
Not Relevant to My Mentorship	3	12	12	92.0
Total	25	100.0	100.0	

Once it was established that there was an increase in both self-efficacy and STEM Fluency, a paired t-test (comparison of the means within subjects) was conducted to determine if the respondents perceived greater increases in self-efficacy or STEM fluency. Findings revealed a STEM Fluency mean of 4.894 with a standard deviation of 1.03 and self-efficacy mean of 5.104 with a standard deviation of .486 with n=22. A two- tailed significance was reported as .295 indicating that there was not a perceived difference in the level of increase between the two variables. Therefore, it can be concluded that the respondents' perceptions of increases in self-efficacy existed and that there was no significant difference between their perception of increase in STEM-fluency and self-efficacy.

R4: Do mentees who present their research to aspirational groups where feedback is given hold higher levels of self-efficacy than mentees who do not present to aspirational groups?

Of the respondents (20) presenting works at a conference, theatre, gallery, etc., 75% reported that self-efficacy increased a great deal. On the other hand, for respondents (5) that did not participate in showcasing their work at an event, only 40% reported a "great deal of increase" in self-efficacy (Table #5). The Chi Square is 17.19. There is a (p-value .191), which is significantly higher than the acceptable cutoff of .05. It can be concluded from this that increases in self-efficacy were reported whether or not a respondent presented their works.

From the interviews, benefits were reported as to presenting of works. For example, participant #1 – "It's really nice to get some outside feedback and outside support … it made me feel very prideful because this is something I worked very hard on…;" participant #5 – "… you kind of underscore the things other presenters did wrong … it's all done in a supportive environment … you have to defend your work … it really keeps you grounded;" and participant #7 – "… humbling, being that we were undergraduates … it was exciting and reviving at the same time."

TABLE 5. Cross Tabulation

		Presentation of Work		Total
		No	Yes	
Increased Some	Count % within Self-Efficacy	3	5	8
Increased a Great Deal	Count % within Self-Efficacy	2	15	17
Total	5	20	25	

To ensure a representative sample of disciplines across the university, participants were recruited by diverse faculty research mentors. Table #6 depicts the disciplines represented in the study, which demonstrated a good balance between the social sciences and STEM proportionate to the student discipline populations of the sample university. Examples of mentored research within the disciplines in this study included: 1) Business – client based projects with deliverables such as market research studies or economic forecasting, and/or research presented at academic conferences; 2) Communications – discipline specific research presented at academic conferences; 3) Education - action research with deliverables such as publications, the employment of academic or behavioral interventions within lab schools, and research presentations at academic conferences; 4) Humanities – (e.g., Holocaust Theatre – dramaturgical research – history culture, Augusto Boal & the Theatre of the Oppressed); Social sciences – discipline specific research for academic conferences (e.g., sociology and psychology) and Criminal Justice (e.g., mock trials, practicums); STEM – client based research (e.g., environmental science on alga blooms) and research to be presented at academic conferences and/or journal publication.

CONCLUSIONS AND RECOMMENDATIONS

The focus of this study was to address through a mixed-methods study to provide breadth and depth of data as well as corroboration of the research findings through both qualitative and quantitative data collection methodologies to provide depth of understanding as to the research questions poised in this study. This triangulation of methods addressed four research questions to reveal the mentees' unique voice as to their perceptions of benefits of the mentoring relationship.

The literature review revealed that learning theory on faculty-student mentoring is scarce. This afforded the proposal of a preliminary conceptual framework, a mentoring third space, within which as a relationship pedagogy adds value to mentees by developing proficiencies and increasing self-efficacy required for a competitive advantage when seeking graduate degrees and career opportunities. This study contributed to the limited body of literature by examining relevant concepts across multiple disciplines demonstrating that irrespective of discipline, undergraduate research mentorships is perceived by the mentee to increase his or her self-efficacy and STEM-fluency (R3), is perceived to add value to the individual seeking a post-baccalaureate degree (R1) and employment decisions (R2). Although from the quantitative data, the benefit from presentation of works (R4) was not fully support; however, the responses in the qualitative data showed that the concept added value. Therefore the model for this study, Mentoring Third Space, where the integration of knowledge moves the undergraduate into the community of practice where academic and professional attributes are attained and social dispositions, beliefs, and aspirations can be optimized was examined (Richards, et al., 2014).

The data (measured across seven (7) of Shellito's 13 characteristics, Table #1) in this study clearly highlights how the third space, "where mentees and mentors become partners, where the integration of knowledge moves undergraduates into communities of practice, and where optimized academic dispositions are attained" can be achieved through mentored undergraduate research (Richards, et al., 2014, p. 11). When responding to the study's surveys and interviews, respondents reported increases in skills, abilities, competencies and knowledge in their fields as well as viewed their mentorship experiences as having increased their self-worth and the value of their degree. Although this study does acknowledge that Shellito's characteristics are the basis for effective mentoring, the study's goal was to measure efficacy of undergraduate mentoring as it relates to the creation of a third space between the mentor and mentee. The intersection of the mentor/mentee relationship (the third space) has been shown to increase the outcomes of self-efficacy and stem fluency, which add value to the mentee's undergraduate degree, optimizing their transition and success in accomplishing post-baccalaureate aspirations.

Findings from the study show that the third space relationship was key in increases in self-efficacy. Thus, the current study supports the works of Pajares (1997) "self-perceptions of capability determine what individuals do with the knowledge and skills they have…self-efficacy beliefs are critical determinants of how well knowledge and skill are acquired in the first place" (p. 2). Findings from the qualitative study also demonstrated that faculty-student relationships developed within the third space are instrumental in fostering marketable competencies. Collectively, the research outcomes of this work suggest

TABLE 6. Participants' Disciplines

Colleges/Schools	Number of Respondents
Business	6
Communications	1
Education	8
Humanities	7
Social Sciences	28
STEM	19
Unreported	10
Total	80

that the value proposition occurs within an effective mentoring third space relationship.

From this study it can be determined that colleges and universities that purposefully support undergraduate mentoring relationships, in which faculty members serve as mentors (as opposed to post-docs and graduate students), have the potential to produce students with a competitive advantage. As evidenced in this study, respondents clearly felt that mentorship experiences added value to their undergraduate degrees. The value-added approach of this work showcases that engaging students in mentorship pedagogy during their undergraduate experiences is a powerful pedagogical tool in reshaping students' perceptions of their potential to successfully matriculate through top tier graduate programs and succeed in professional careers.

Limitations of the Study and Future Research

The study was limited in scope. The research did not include the voices of faculty mentors or university administrators. These respondents, however, were not the focus of this study and data will be collected in future research to provide an even clearer picture of the value of the third space mentoring relationship. Further limitations include data collection from a small liberal arts university and the use of a snowball sampling methodology.

For future research, one recommendation is a survey of alumni after a lengthier period of time beyond the undergraduate experience (five to ten years). This will allow for reflection and clarity of self-knowledge as well as determine the extent to which they have become mentors. Future research is recommended to analyze the data in respect to different attributes of diversity. In addition, because the mentorship relationship engages mentors and mentees, it is important that mentors' perceptions are measured to evaluate their roles in the value-added as a result of the relationship pedagogy.

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