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The Who, What, and Where of Learning Strategies

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Abstract

Learning strategies have been shown to be an important part of success in the classroom, but little research exists that examines differences across major fields concerning the use and faculty emphasis of learning strategies. This study uses data from the National Survey of Student Engagement and the Faculty Survey of Student Engagement to explore whether there is congruence for academic disciplines between the student use and faculty encouragement of learning strategies. Patterns in the results suggest that are certain fields, including health professions, biology, agriculture, natural resources, and social service professions most frequently emphasizing and using learning strategies, while others, including engineering, physical sciences, mathematics, and computer science are less likely to do so. OLS regression models also suggest demographic and environmental predictors of student use of learning strategies, such as gender, enrollment status, cumulative college grades, Greek affiliation, and participation in a learning community. Potential reasons for and implications of these findings are discussed.

Keywords: Learning strategies, disciplinary differences, environmental support, learning communities.

As an important component of the classroom experience in higher education, learning strategies are specific patterns or combinations of academic activities that learners use to gain knowledge (Vermetten, Lodewijks, & Vermunt, 1999; Vermunt, 1996). There are a variety of methods that students can use when studying and learning, and these self-regulating behaviors contribute to student success in a variety of ways. Learning strategies can range from taking notes when reading and in class, to summarizing and organizing new information, to creating an environment that is conducive to studying (Ormrod, 2011). Additionally, learning strategies contribute to regulating and monitoring time, concentration, and enhancing comprehension (McKeachie, Pintrich, & Lin, 1985). Thus, students' use of learning strategies is closely related to their perception of an emphasis on mastery or performance goal orientation in the classroom (Ames & Archer, 1988).

Learning strategies, through their connection with enhanced metacognitive skills, are additionally relevant to interdisciplinary learning, where students move past declarative and procedural knowledge in a single discipline and apply concepts and themes across multiple areas (Ivanitskaya, Clark, Montgomery, & Primeau, 2002). Metacognition, or "thinking about thinking," as a learning strategy is demonstrated in the ability to reflect upon,

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understand, and control one's own learning. Metacognition can directly impact effectiveness of student study, preparation, and classroom time, including how information is learned and retained, and it is related to learning outcomes and success in college. Research suggests that students with greater metacognitive skills have higher grades on classroom exams (Isaacson & Fjuita, 2006), grades in individual courses (Young & Fry, 2008), and cumulative grade point average (Everson & Tobias, 1998; Hall, 2001). Students with these skills are also better at accurately predicting test performance and using formative feedback (Ibabe & Jauregizar, 2010). Furthermore, metacognitive skills are effective across a variety of domains (Everson, Tobias, & Laitusis, 1997), types of tasks (Young & Fry, 2008), and levels of student ability (El-Hindi & Childers, 1996).

While students just beginning their journey in higher education may vary in how effectively they use learning strategies, these should not be considered a fixed ability but rather a fluid skill. As such, increasing the effective use of learning strategies is quite actionable for faculty, staff, and administrators at higher education institutions. Such skills can be increased through a variety of instructional strategies (Schraw, 1998). Research has indicated success in teaching metacognitive skills to students through online self-assessment programs (Ibabe & Jauregizar, 2010), academic support courses for at-risk students (El-Hindi & Childers, 1996), direct tutoring sessions (DeKonty Applegate, Benson Quinn, & Applegate, 1994), and classroom learning contracts (Chiang, 1998).

The curricular environment does not limit the relevancy of learning strategies or their ability to be developed either. At first consideration, one might assume learning strategies to be the most applicable to a traditional classroom format of a professor lecturing while students take notes. However, there is recent research to suggest that learning strategies are effective for other specific pedagogical methods as well. For instance, Downing and colleagues (2009) found that the use of a problem-based learning curriculum increased metacognitive development. Self-regulating learning strategies also increase student success in academic writing tasks (Hammann, 2005), which is an important skill across many disciplines. Supplemental instruction is another curricular approach relevant to learning strategies, as Ning and Downing (2010) found that a peer-assisted instructional intervention increased learning competence and academic performance, even after controlling for pre-intervention learning strategies and academic achievement. Learning strategies are also beneficial for completing assignments that involve online research, as metacognitive awareness allows students to evaluate the credibility and usefulness of sources found during research (Hofer, 2004).

Aspects of the academic and sometimes even residential environment can also affect the learning strategies being used and developed. A prime example of this would be learning communities, which connect the students' academic studies and the living experience on the college campus (Ebbers & Lenning, 2014; Kuh, Kinzie, Schuh, Whitt, & Associates, 2005; Zhao & Kuh, 2004). Pascarella and Terenzini (2005) define learning communities as "an attempt to move collaborative learning beyond the classroom and into broader aspects of a college student's life" (p. 109). While the requirements of learning communities differ from campus to campus, it is universal that in some way learning communities expand and continue the student learning experience to reach beyond the classroom. Pas-

carella and Terenzini's review of the literature on learning communities found that there was "some evidence to suggest that participation in learning communities is linked with student perceptions that they are deriving greater benefit from their academic experiences during college" (2005, p. 109). These benefits go beyond disciplines (Dascalu, et al., 2014; Gannon-Leary & Fontainha, 2013) and extend to the online environment as well (Marin, 2014; Popkin & Lamb, 2014).

In a previous study, Zhao and Kuh (2004) examined the relationship between learning communities and student engagement. They found that participation in learning communities was positively linked to engagement. Furthermore, they also examined the impact of learning communities on grades, finding that first-year students in learning communities had lower grades than those without learning community experiences, but they also had lower SAT/ACT scores. After controlling for SAT/ACT and several other variables, the grades of the first-year students in learning communities were similar to those that were not. However, when examining seniors, there were "no differences in the grades of seniors between those who did and did not have a learning community experience" (Zhao & Kuh, 2004, p. 124), but after controlling for other variables, the grades of those seniors in learning communities were slightly better than those that were not. It is important to determine evidence for the continuation of this learning community trend, even as higher education environments shift toward the development of online spaces and the changing demographics of students. Programs like learning communities require substantial resources from universities, so demonstrating positive outcomes is certainly needed from a logistic perspective.

Research Questions

Given the knowledge that learning strategies are effective within multiple curricular approaches, one might assume that learning strategies are appropriate in many different academic disciplines. However, there is a lack of research within higher education that explores the actual use of learning strategies across different major fields. Research by Birenbaum (1997) found that disciplinary differences between education and engineering students are minimal compared to other influences. Nevertheless, there are many other academic majors that are most likely utilizing learning strategies. In what disciplines do students report the most and least frequent use of learning strategies? Furthermore, in what disciplines do faculty report the greatest amount of encouragement of learning strategies in their courses? Is there correspondence between what faculty report encouraging, and what students report actually doing? Does a student living environment that supports learning (such as a learning community) increase students' use of learning strategies? What are some additional student-level predictors of learning strategy use?

Theoretical Framework

The current study seeks to explore these research questions with data from the National Survey of Student Engagement (NSSE) and the Faculty Survey of Student Engagement (FSSE). Taking into account previous empirical research on the use of learning strategies and their connection to successful academic outcomes, it may be beneficial to frame this

research within the work of Pintrich (2004) and his conception of the self-regulatory perspective (SRL) on student motivation and learning. The SRL perspective views students as active participants in learning, who can "monitor, control, and regulate certain aspects of their own cognition, motivation, and behavior as well as some features of their environment" (Pintrich, 2004, p. 387). The SRL perspective has replaced the Information Processing (IP) perspective, which Pintrich (2004) critiqued for being "too limited and not reflective of current theory and research" (p. 386). The SRL perspective expands its perspective of student learning to include affective and social contextual factors. Pintrich (2004) proposed a conceptual framework, based on a SRL perspective. His framework accepts four assumptions of self-regulated learning. They are:

(1) "Learners are viewed as active participants in the learning process;
(2) Learners can potentially monitor, control, and regulate certain aspects of their own cognition, motivation, and behavior as well as some features of their environment;
(3) SRL models of regulation assume that there is some type of goal, criterion, or standard against which comparisons are made in order to assess whether the learning process should continue as is or if some type of change is necessary;
(4) ..Self-regulatory activities are *mediators between personal and contextual characteristics and actual achievement or performance*" (p. 387-388).

Pintrich's (2004) framework details self-regulated learning in four phases, and within those phases, four lenses on regulation. The phases reflect planning, monitoring, control, and reaction and reflection. Pintrich acknowledged that "not all academic learning follows these phases as there are many occasions for students to learn academic material in more tacit or implicit or unintentional ways without self-regulating their learning in such an explicit manner as suggested in the model" (p. 389). The phases do suggest an ordered sequence that learners would go through, but the structure of these phases (hierarchically or linearly) are not assumed and can vary in their order. Through the current study, we examine the student and faculty perspectives on self-regulated learning in the higher education setting. Although the terminology may differ somewhat between self-regulated learning, metacognition, and learning strategies, all address a very comparable notion: that there are student cognitions and behaviors associated with a heightened learning experience, and these may be encouraged by faculty and influenced by environmental supports.

Methods

Participants

The data for this study are from the 2013 administrations of the National Survey of Student Engagement (NSSE) and the Faculty Survey of Student Engagement (FSSE). NSSE is an annual survey administered to first-year and senior students at four-year colleges and universities across the country that documents the extent to which students engage in educationally purposeful activities that have been shown to support and promote student success (McCormick, Kinzie, & Gonyea, 2013). As a companion to NSSE, FSSE was

designed to measure faculty perceptions and expectations of the same educationally purposeful student activities. In addition, FSSE asks faculty about their promotion of learning and development in their courses and the allocation of their time, both course-related and outside of their courses. In 2013, NSSE was administered to students at over 620 four-year colleges and universities, and FSSE was administered to faculty at 146 institutions. The average institutional response rate for NSSE was 30% (27% for first-year students and 33% for seniors) (NSSE 2013 Overview, 2013). For FSSE, the average institutional response rate was 49% (FSSE 2013 Overview, 2013).

For this particular study, only those institutions that participated in both NSSE and FSSE could be included, so that brought the total participants down to just about 16,300 first-year students, 30,000 seniors, and 12,566 faculty at 121 institutions. Of those students who participated, about one-third were male and a majority reported their ethnicity as Caucasian. The subset of students and institutions closely mirrored those in the overall NSSE and FSSE administrations, which in turn closely resemble the national landscape for both students and institutions (FSSE 2013 Overview, 2013; NSSE 2013 Overview, 2013).

Measures

The dependent variable, students' reported frequency of use of learning strategies, was a scale derived from three items that asked how often during the current school year students have: "identified key information from reading assignments"; "reviewed your notes after class"; and "summarized what you learned in class or from course materials." The four response options for these three items ranged from "Never" to "Very often." As part of a larger exploratory factor analysis and confirmatory factor analysis for the NSSE survey, a single scale for learning strategies was created from these items (the development of the NSSE engagement indicators is discussed on the NSSE website: http://nsse.iub.edu/html/engagement_indicators.cfm) by first converting the three item to a 60 point scale and then averaging these recoded values. The scale scores ranged from zero (responded "Never" to all four items) to 60 ("Very often" on all four). The alpha reliability coefficient for this scale was 0.77 for first-year students and 0.78 for seniors.

To explore the dimension of discipline, the grouping variable for this study, a categorization that included 11 major groupings was included. These major groupings are listed Table 1 with the frequencies for first-year students, seniors, and faculty members. The largest discipline for first-year students was health professions (16%) and the smallest was communications, media, and public relations (3%). Seniors were mostly likely to report being business majors (18%) and least likely to be majoring in communications, media, and public relations or physical sciences, agriculture, and natural resources (each 3%). For faculty, the most frequently reported discipline was arts and humanities (24%) and the least was engineering (3%). The NSSE and FSSE disciplinary areas were similar to those in the U.S. profile, but there were some slight differences. Seniors in art & humanities major(s) are slight more represented in the sample and engineering major(s) are slight less represented when compared to the U.S. profile (U.S. Department of Education, National Center for Education Statistics, 2015). A greater proportion of faculty respondents

Table 1. Discipline Frequencies for Students and Faculty.

Disciplines	First-Year Students	Seniors	Faculty Members
Arts & Humanities	10%	11%	24%
Biological Sciences, Agriculture, & Natural Resources	10%	6%	6%
Physical Sciences, Mathematics, & Computer Science	5%	3%	11%
Social Sciences	13%	15%	12%
Business	14%	18%	10%
Communications, Media, & Public Relations	3%	3%	4%
Education	10%	11%	9%
Engineering	6%	4%	3%
Health Professions	16%	14%	10%
Social Service Professions	5%	6%	5%
Other disciplines	4%	8%	8%

were in the arts and humanities and a smaller proportion were in the communications, media, and public relations majors (FSSE 2013 Overview, 2013). These differences are mostly likely due to the pool of institutions that choose to participate in NSSE and FSSE, because very few of the participating institutions fall outside of the eight major Carnegie classifications. These majors are the upper level categorizations and the individual majors included in each of these categories can be found in the NSSE codebook (http://nsse.iub.edu/2013_Institutional_Report/data_codebooks/NSSE%202013%20%20 Codebook.pdf). In any case, for the analyses the number of respondents in each of the majors was still quite substantial, as the samples for NSSE and FSSE are large. For the 11 major categories, dummy variables were created (with Arts & Humanities as the reference group).

In accordance with the research questions, the two independent variables of interest were participation in a learning community and an aggregated value for faculty emphasis on learning strategies. Participating in a learning community was captured by one NSSE question that asked about participation "in a learning community or some other formal program where groups of students take two or more classes together," dichotomized to whether or not they had had this experience. The faculty learning strategies scale score was derived by three items on FSSE. Faculty responded on a four-point scale from "Very little," to "Very much" to "In your selected course section, how much do you encourage students to do the following?" The three items mirrored those on NSSE ("identify key information from reading assignments"; "review notes after class"; and "summarize what has been learned in class or from course materials"), with a scale alpha reliability coefficient of .87. The variable representing faculty's course emphasis on students using learning strategies was calculated by averaging the faculty learning strategies scale score within each discipline, level (lower-division or upper-division selected course section), and

institution. This average score was then matched with each student by student major, class (first-year or senior), and institution.

We also used several demographic characteristics as controls for statistical modeling purposes. Student characteristics included: gender, race/ethnicity (with White as the reference group), age, enrollment status, first-generation status, transfer status, international status, Greek affiliation, living on campus, athlete status, cumulative college grades, distance education status, and discipline (with Arts & Humanities as reference group). Institutional characteristics included: Carnegie classification (with Baccalaureate Arts & Sciences as the reference group), enrollment size, and control. Previous research (Pascarella & Terenzini, 2005) suggests that there are differences in student engagement and educational experiences for students based on these characteristics. All variables in the model can be seen in Table 2.

Results

First, to explore the existence of disciplinary differences for students' use and faculty members' emphasis of learning strategies, means were calculated for each of four groups: first-year students, senior students, faculty whose selected course was lower division, and faculty whose selected course was upper division. Using 4 preliminary chi-squared analyses (one for each faculty and students and at each level), the discipline differences were found to be statistically significant (means can be seen in Figure 1 & 2 and standard deviations ranged from 14 to 17 across the disciplines in all 4 groups). Since congruence was found between first-year students and faculty teaching lower division courses (see Figure 1) and also between seniors and upper division faculty (see Figure 2), aggregate faculty measures were calculated not only based on institution, but also within discipline and course level and then matched with the appropriate first-year or senior students within those same majors. For the second part of the analyses, a pair of ordinary least squares (OLS) regressions (one for first-year students and one for seniors) were used to investigate the relationship between the two measures of interest (the aggregated average of faculty emphasis placed on using learning strategies and student participation in a learning community) and students' use of learning strategies. In addition, controls for student and institutional characteristics were included.

First-Year Students

For first-year students, the results indicate that 13 of the student characteristics were significant predictors of their use of learning strategies (Table 2). Students who were online-learners, first-generation, female, transfers, older, Black or African American, in the biological sciences, social sciences, or health professions, or had Greek affiliation were more likely to use learning strategies. In contrast, students who were international or lived on campus were less likely. Institutional control (public vs. private) was the only institutional characteristic that was statistically significant. While faculty emphasis on learning strategies was not a statistically significant predictor of first-year students' use of learning strategies, participating in a learning community was significant (beta = .078, $p < .001$). Overall, the strongest predictor was cumulative college grades (beta = .111, $p < .001$).

Table 2. OLS Regression Results: Effects on Students' Use of Learning Strategies[a].

Independent variables	First-Year	Seniors
Student & Institutional Characteristics		
Online-learner	.068***	.062***
First-generation status	.026**	
Female	.069***	.071***
International	-.024**	
Greek affiliation	.023**	.021***
Living on Campus	-.06***	-.047***
Athlete		
Full-time		.026***
Transfer Status	.026**	.041***
Age	.060***	.122***
Grades: Mostly A's	.111***	.082***
Asian[b]		
Black or African American[b]	.040***	.067***
Hispanic or Latino[b]		.023***
Other race/ethnicity[b]		.020***
Prefer not to respond[b]		
Biological sciences[c]	.057***	.032***
Physical sciences[c]		
Social sciences[c]	.036**	.022**
Business[c]		
Communications[c]		-.013*
Education[c]		
Engineering[c]		-.026***
Health professions[c]	.064***	.030***
Social service professions[c]		
Other major[c]		
Research University (very high)[d]		
Research University (high)[d]		-.041***
Doctoral/Research University[d]		
Masters (large)[d]		
Masters (medium)[d]		
Masters (small)[d]		
Baccalaureate Colleges - Diverse[d]		
Private	.038***	
Institutional size		.037***
Participation in a learning community	.078***	.110***
Aggregated Faculty Emphasis on LS		.023***
Total R^2	.065***	.083***

[a] All non-significant coefficients have been removed.
[b] Reference group: White
[c] Reference group: Arts & Humanities
[d] Reference group: Baccalaureate Colleges – Arts & Humanities
*p<.05; **p<.01; ***p<.001

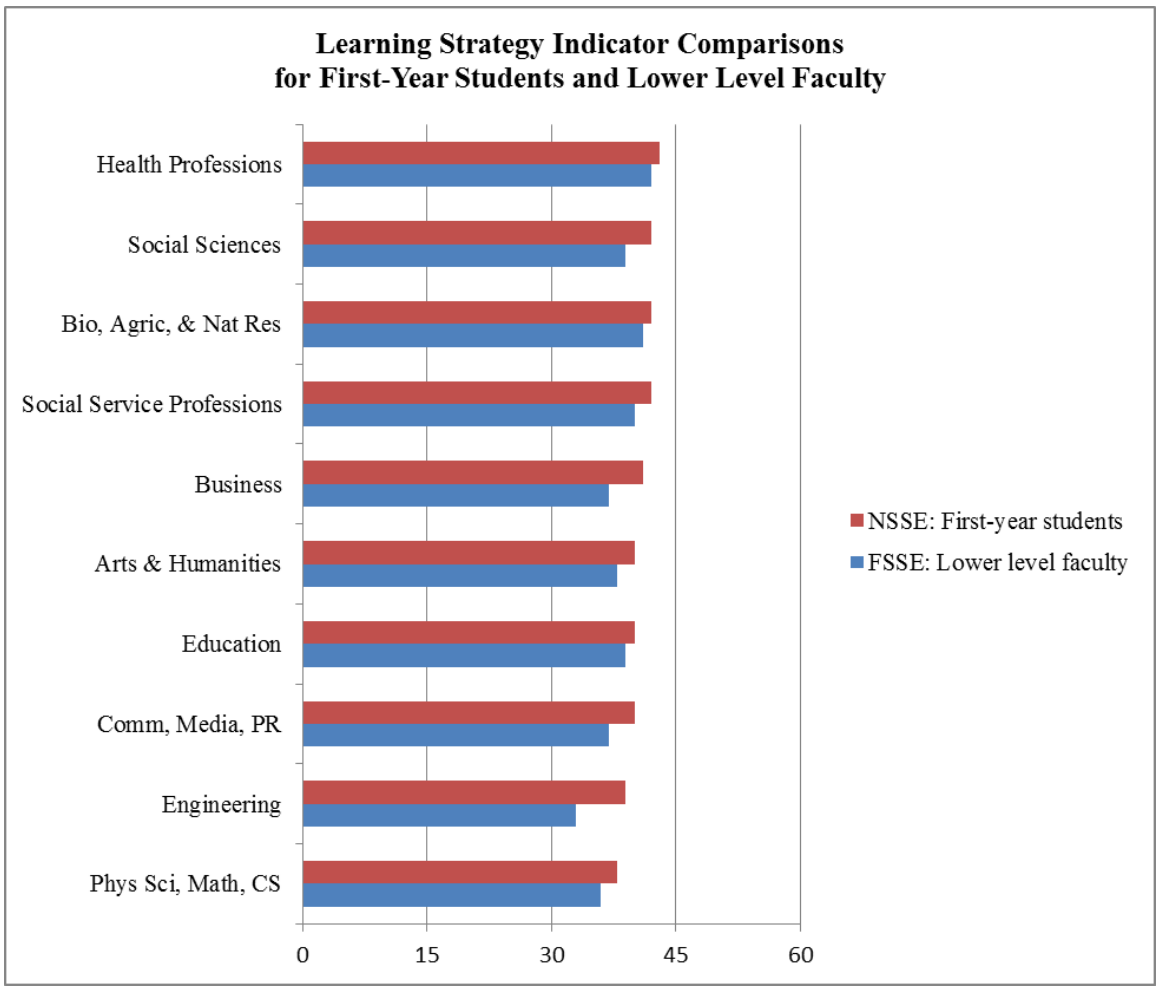

Figure 1: Learning Strategy Indicator Comparisons for First-Year Students and Lower Level Faculty.

Together, the model accounted for 6.5 percent of the total variance in student frequency of use of learning strategies ($R^2 = .065$, $p < .001$).

Seniors

For seniors, the results indicate that 16 of the student characteristics were significant predictors of their use of learning strategies (Table 2). With only a few exceptions, the same patterns that were seen for first-year students were mirrored in senior students as well. Seniors who were online-learners, female, athletes, transfers, older, Black or African American, Hispanic or Latino, another race, in the biological sciences, social sciences, or health professions, or had Greek affiliation were more likely to use learning strategies. In contrast, students who lived on campus or were in communications or engineering were less likely to use them. Both size and the Carnegie classification of Research University (high) were institutional characteristics that were statistically significant. Additionally,

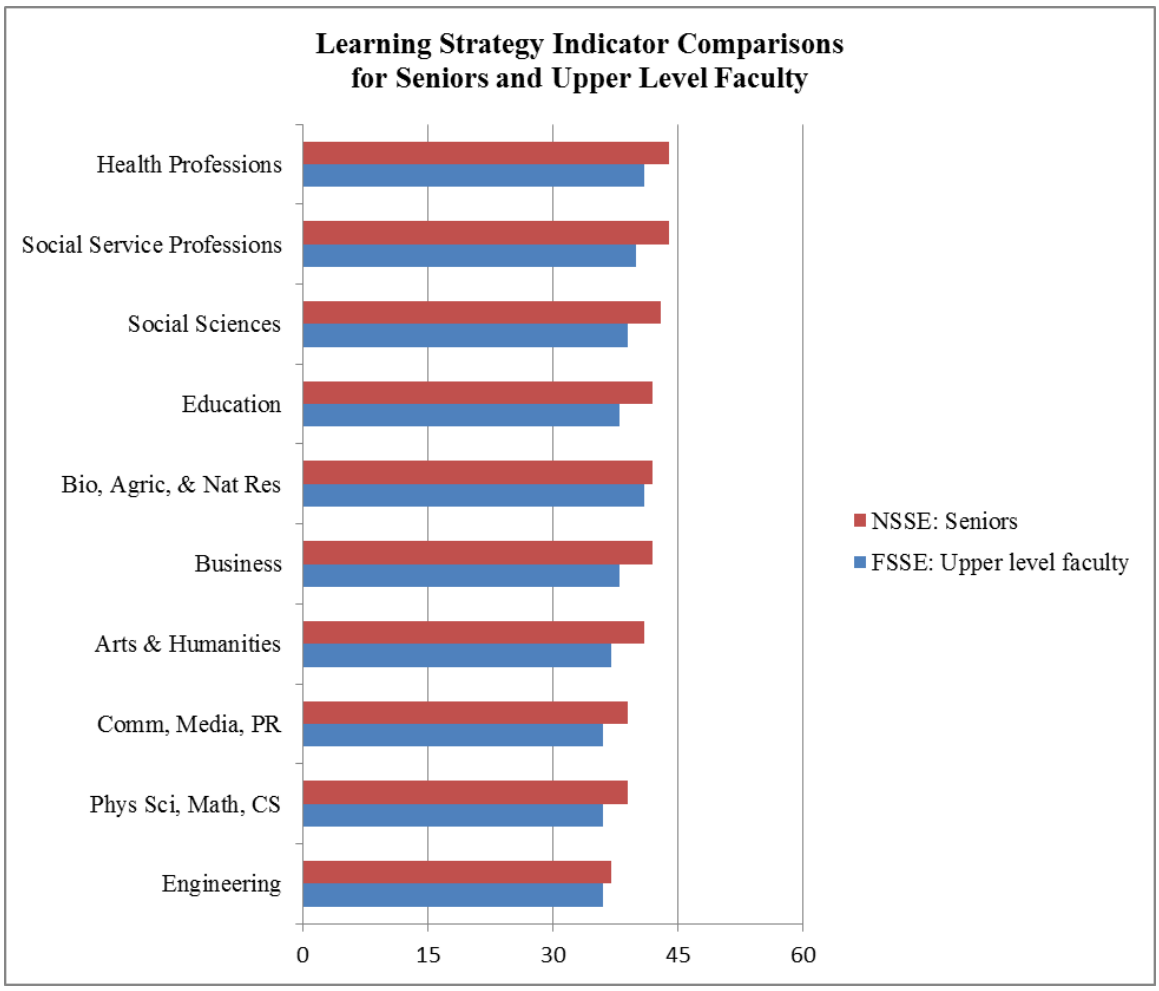

Figure 2: Learning Strategy Indicator Comparisons for Seniors and Upper Level Faculty.

both faculty emphasis on learning strategies (beta = .023, $p < .001$) and participating in a learning community (beta = .110, $p < .001$) were statistically significant predictors of the frequency of use of learning strategies. In fact, the only predictor stronger than participating in a learning community, making it the strongest in the model for seniors, was age (beta = .122, $p < .001$). Together, the model accounted for 8.3 percent of the total variance in student frequency of use of learning strategies ($R^2 = .083$, $p < .001$).

Discussion and Implications

When examining the descriptive statistics comparing students to faculty scores on learning strategies, this study found evidence for a general pattern of congruence between the two groups. For both first-year students and lower division faculty, those majoring in or primarily instructing health professions; biology, agriculture, and natural resources; and social service professions tended to cluster near the top of the scores, while conversely those in engineering as well as physical sciences, mathematics, and computer science

were nearer the bottom of the group. Similar patterns were found when comparing trends between seniors and upper division faculty, and these findings are further corroborated when looking at the results of the regression models as well. Given knowledge of general curricular differences in these disciplines, these results are not necessarily surprising. Engineering and mathematics majors are probably less likely to have traditional reading assignments, and verbal summaries of information may be less important for their success than acquired procedural knowledge. While in this study students from those disciplines did not report use of these learning strategies, in the larger field engineering and mathematics scholars and practitioners are engaged in research on this topic and have introduced other innovative strategies that are research-based into the discipline around classroom learning (e.g. Ro & Loya, 2015; Webb, Stade, & Grover, 2014). On the other hand, the clinical and applied lessons from health and social service professions may lend themselves particularly well to summarizing what information was learned, and key information in the form of medical or biological vocabulary terms may be especially apparent in the reading assignments of biology or health science majors.

When looking at the other variables in the regression models, there were additional findings that were not remarkably unexpected, given the existing literature on student engagement (Pascarella & Terenzini, 2005; Ro & Loya, 2015). For both the first-year students as well as the seniors, females and students with higher cumulative college grades were more likely to be frequently using learning strategies, with higher cumulative college grades having one of the relatively largest coefficients. One would expect that use of learning strategies would go hand in hand with the tangible outcome of better cumulative college grades. Another expected finding was that for seniors, students with full-time status used more learning strategies than their part-time peers, which also makes sense given their additional experiences with coursework. This is in alignment with prior research on the differences between full-time and part-time enrollment status (NSSE, 2012).

Other results from the regression models are consistent with the idea of environmental supports for enhancing learning and success. Both first-year and senior students who are Greek-affiliated were more likely to use learning strategies, which may be due not only to minimum GPA requirements, but also to the presence of structured membership education activities such as study tables and peer tutoring sessions. This adds to existing research on fraternity and sorority membership (Armstrong & Grieve, 2015). This finding is also in alignment with earlier research by Pike and Askew (1990) and DeBard and Sacks (2010) who found that Greek-affiliated students' grades were not negatively impacted as a result of their Greek-affiliation. DeBard, Lake, and Binder (2006) make specific suggestions concerning ways to promote academic success among new Greek members, noting that required orientation classes to support study strategies and proactive academic behaviors are useful. Moreover, Greek life membership may offer some similar benefits to those of learning communities, as Whipple and Sullivan (1998) suggest that the sense of belonging associated with Greek affiliation, as well as opportunities for leadership, self-governance, and community service are all linked to positive educational experiences.

Furthermore, the physical environment of the classroom, or lack thereof, may play a role as well, since students who were taking all of their classes online were more likely to use learning strategies. This may be a result of the structure of the courses themselves, which rely on more independent self-regulation from the students to read material, watch videos, and complete a variety of other tasks involved with course assignments (Richardson, Morgan, & Woodley, 1999). Online learning environments frequently require students to plan, monitor, react, and reflect (Robinson & Hullinger, 2008). All of these activities require students to integrate and actively practice multiple phases of SRL (Pintrich, 2004; Smart & Umbach, 2007).

Characteristics of this self-directed learning may also interact with other aspects of the students themselves, which could explain why older, non-traditional aged students as well as students that live off-campus are more likely to use learning strategies. Older students may need to be more focused in the allocation of their study time, as they may have jobs, families, and other non-school-related time commitments. This might apply to commuter students living off-campus as well. They must distribute their hours carefully, planning out efficient use of their time on campus and taking into account travel and other activities in their schedule. Certainly age, campus access, and other demographics could be interpreted as some of the personal and contextual characteristics that are mediated through the use of self-regulatory learning activities, as stated in Pintrich's (2004) theory. This is in alignment with earlier research by Wolters and Benzon (2013), who used a series of multiple regressions analyses on student self-reported data to look for a relationship between motivation and self-regulation. They found that student engagement in motivational regulation was a function of existing motivational beliefs and attitudes.

A final piece of the analysis that provides evidence for the role of environmental elements was that participation in a learning community had a positive impact on the use of learning strategies. Learning communities, which also may include an explicit "study skills" course component, place students in an environment that enhances their scholarly interactions with peers, providing academic modeling of good study habits (Hill & Woodward, 2013; Pike, Hansen, & Lin, 2010; Stefanou & Salisbury-Glennon, 2002). However, it may also be that case that students who are more intrinsically motivated and interested in mastery of course material for the sake of knowledge itself may be more likely to both use learning strategies and participate in learning communities. This interpretation is also fitting with one assumption of Pintrich's (2004) SRL framework, which notes that learners can control aspects of their own motivation as well as features of their environment. Although these results are promising, more research is needed to determine the direct outcomes of specific learning community participation, as their structures and requirements can vary greatly between institutions.

Another noteworthy finding from the regression models involves the influence of faculty emphasis of learning strategies. Faculty emphasis of learning strategies, aggregated to the discipline level, was a positive predictor of the student use of learning strategies. However, this finding was only significant for the upper division faculty with the senior students. This may be due to the fact that although many first-year students have declared (or least formed an idea of) a major, they are likely to be actually taking courses in a va-

riety of disciplines in order to complete their core curriculum requirements. Therefore, they may not be taking *enough* major courses for the effect of faculty disciplinary emphasis to be apparent. Once students make it to their senior year, they are usually finished with their general education courses and primarily focused on those in their major. Lower division faculty could respond to this finding by incorporating a discussion of learning strategies into the course syllabi and reviewing learning strategies before and after an examination. Furthermore, centers for teaching and learning could offer seminars on how faculty can better integrate learning strategies into the classroom. Faculty and department chairs could also consider adding undergraduate learning assistants to entry level courses in the discipline or major to assist with better promoting learning strategies to first-year students (Learning Assistant Alliance, 2016).

Several elements of these results can be interpreted through the work of Pintrich (2004) and the self-regulatory learning theory. It may also be useful to view these results from a constructivist perspective. The constructivist perspective is not limited to a particular pedagogy, rather it is a theory about the role of the learner as s/he constructs new understandings and integrates new content into existing knowledge and frameworks for understanding. Foundationally, constructivism is interested in helping to strengthen the learner's ability to better understand, better learn, and better problem solve in real world scenarios and problems. Students' uses of learning strategies are an extractable measure where researchers and instructors can look within process measures to see what methods students use to create and consider new knowledge. As Schwartz, Lindgren, & Lewis (2009) criticized, seldom do professionals, researchers, and instructors have metacognitive discussions about the student use of learning strategies, let alone assessments of students' growth in their capacity to learn.

Limitations

There are several limitations to this study that must be considered when interpreting the results and generalizing the findings. First, although the sample is comprised of a wide range of students attending multiple institutions, it is not representative of all students and faculty at four-year colleges and universities in the United States. Colleges and universities elect to participate in NSSE and FSSE for a variety of reasons, mainly for institutional improvement, which may impact the context of the student experience. Additionally, this study does not account for the variation in learning community experiences, which could differ greatly from one institution to another depending on resource allocation and support. Furthermore, given the research design, this study was unable to test for causal relationships between variables, but can only confirm whether or not they are associated. This study also relied on self-reported behaviors, which may not be completely objective. However, most studies looking at student self-reports in higher education suggest that self-reports and actual abilities are positively related (Anaya, 1999; Hayek, Carini, O'Day, & Kuh, 2002; Laing, Sawyer, & Noble, 1988; Pace, 1985; Pike, 1995). Finally, there were relatively weak effect size (beta) coefficients and low percentage of explained variance from the overall models, which suggests that there are many other factors not included in the analyses influencing student use of learning strategies. Therefore, the results should be interpreted with caution.

Conclusion

Although there are some limitations, this study makes a notable contribution to the higher education research on learning strategies. It provides support for disciplinary differences across both student use and faculty encouragement of learning strategies. Furthermore, it delivers additional endorsement of known trends in student engagement while offering information about the importance of supportive structured environments as well. This study suggests the need for a more thoughtful inclusion of learning strategies in some disciplines. It would seem that if faculty are encouraging learning strategies, students do indeed increase their usage. Thus faculty members in certain fields may need to find ways to foster these beneficial practices in their courses. In order to successfully target these reforms, future research is needed to explore the nuances in learning strategies between different academic majors and curricular practices at various points in the undergraduate student experience.

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