Peer-Reviewed Article

Exploring the Peer Tutor Experiential Learning Process

James Cole
Indiana University

Page Keller
Knack Technologies, Inc

Jillian Kinzie
Indiana University

George D. Kuh
Indiana University

Abstract

While peer tutoring is a valued experiential activity, little is known about the peer tutoring experience and its relationship to desired 21st-century outcomes of college. This paper features the results from a multi-institution study of the characteristics and benefits of peer tutoring for tutors. The National Survey of Student Engagement was administered along with a set of experimental questions specifically designed to interrogate the process of peer tutoring at 30 four-year institutions. A total of 3,715 seniors were included in the study. In general, peer tutors who identified as seniors in college showed patterns of engagement and gains in learning and personal development that exceeded substantially those of their non-tutor counterparts, especially for those who received training and feedback from supervisors. These findings have implications for tutoring program administrators, experiential educators, and others to enhance the effects of peer tutoring and other experiential learning activities.

Introduction

Experiential learning aims to have students participate in structured, educationally purposeful activities tied to concrete, real-world situations so students can practice applying what they know in new contexts. Such activities emphasize the process of learning more than the product of learning, highlighting working with others in ways that foster meaningful relationships, develop trust, and create a growth mindset in students (Roberts & Welton, 2022). Today, different forms of experiential learning are recognized as valuable for all students in higher education as institutions strive to engage more undergraduates in

high-impact practices (Kuh, 2008; Roberts & Welton, 2022; Wurdinger & Carlson, 2010). To achieve the powerful outcomes of experiential learning, students must interact with others, reflect on their experience, and receive feedback about their performance.

Given this educational value, it is no surprise that many instructional approaches feature learning through experience (Dewey, 1939; Kolb, 1984; Mayhew et al., 2016). In addition to "learning by doing," such approaches often emphasize the importance of peer influence on student development. Indeed, according to Astin (1993, p. 398), peers are "the single most potent source of influence ... affecting virtually every aspect of development—cognitive, affective, psychological, and behavioral." Vygotsky's (1978) zone of proximal development theory features peers as sources of support and guidance, especially when students are similar in stage of development and experience (Mayhew et al., 2016).

Fundamentally, the more interaction students have with their peers (and with faculty), the more satisfied overall they are with the college experience (Astin, 1993; Kuh, 2003; Pascarella & Terenzini, 2005). Educationally purposeful peer interactions (EPPIs) are congenial with academic values and help foster student development (Anderson, 2021; Kuh et al., 2021). For example, student contact with supportive, right-minded peers can positively influence overall academic development, knowledge acquisition, analytical thinking, problem-solving, and self-esteem (Kuh, 1993, 1995). Although peer support among students can come in many forms, including from roommates, classmates, co-workers, and friends, it can also stem from participation in more formal, structured experiences, such as learning communities (Goldman, 2012; Kuh, 2008; Zhao & Kuh, 2004), supplemental instruction (Moore & LeDee, 2006; Ogden et al., 2003), and tutoring (Ashwin, 2003; Preszler, 2009). Peer support in the form of peer teaching and tutoring helps students feel connected to their college community and effectively respond to new academic challenges (Carini et al., 2006; Cruce et al., 2006). Moreover, the opportunity for students to help peers learn by serving as tutors is a formal way for students to learn by doing.

Peer tutoring in higher education, the experiential learning focus of this paper, refers to the practice where undergraduate students presumed to have relevant knowledge provide course-specific content and study skills support to their fellow students (Colvin, 2007; Keller & Porter, 2020). The existing scholarship about peer tutoring focuses predominantly on the academic and personal developmental gains realized by those being tutored (Colvin, 2007; Mayhew et al., 2016). Indeed, in their massive synthesis of the research about college student learning and personal development, Mayhew et al. (2016) concluded that peer tutoring helps foster tutored students' verbal, quantitative, and subject matter competence.

Less attention has been given to the benefits that may accrue to tutors themselves including their academic achievement, personal growth, and acquisition of future career skills, although the literature is promising. For example, fundamental to tutoring is making complex information accessible and comprehensible to others; this requires that tutors know the material more thoroughly than if they were only studying it for themselves, which in turn is thought to foster critical thinking skills. Tutoring presumably also requires adapting to diverse learning styles, facilitating problem-solving, and managing scheduling demands, which helps cultivate effective communication, time management (Annis, 1983; Bargh & Schul, 1980), and cognitive engagement and conceptual learning (Benware & Deci, 1984; Pascarella & Terenzini, 2005).

Some evidence suggests that tutoring also fosters feelings of belongingness, heightened self-esteem, and self-efficacy, thereby contributing to overall psychosocial well-being and academic moti-

vation (Kuh, 1993, 1995). Such outcomes are arguably beneficial to academic success and transferable to settings on and off campus during and after college. Finally, peer tutors may receive stipends for their work; in some instances, academic credit may be awarded (Pascarella & Terenzini, 2005), thereby addressing vital equity goals in postsecondary education. Through the tutor experience, students learn by doing—acquiring relevant practical knowledge and practicing essential proficiencies needed for their career and life beyond college.

Warrant for the Study

Peer tutoring is a widespread phenomenon involving a large-though-unknown number of students as tutors and those being tutored (tutees). More than two-thirds of post-secondary institutions in the United States implement some form of peer tutoring (Kim et al., 2016). According to Topping (2018), 85% of institutions in 15 different countries have at least one form of peer tutoring program, suggesting a global trend toward the acceptance and institutionalization of peer tutoring. Given the ubiquity of peer tutoring and the interest in expanding experiential learning to more students, it is important to explore the effective qualities and outcomes for tutors.

Most of the research about peer tutoring in U.S. colleges and universities is based on single institution convenience samples of students, many of which target particular groups of students, courses, and subject matter (e.g., first-year students in Introduction to Chemistry). Absent from this research are inquiries using a nationally normed instrument measuring engagement in effective educational practices and selected learning and personal development outcomes of tutors at multiple colleges and universities including both in-person and online tutoring formats. To verify the claims about the benefits of peer tutoring for tutors, evidence is needed to demonstrate that confidence and institutional investments in peer tutoring are warranted.

The purposes of this exploratory study are: (a) to identify the salient features of peer tutoring, and (b) to examine the relationships between the undergraduate peer tutoring experience and peer tutors' student engagement and self-reported gains on a variety of desired learning and personal development outcomes of college. More specifically, the study was guided by four questions:

1. What are the salient features of the peer tutor experience?

2. Are peer tutors more engaged in effective educational practices compared with their counterparts who are not tutors?

3. Do peer tutors report greater gains in desired learning and personal development outcomes compared with their counterparts who did not tutor?

4. Are peer tutors' engagement and learning and personal development outcomes associated with tutoring frequency, tutoring mode (in-person or online), training, and supervisor feedback?

Methods

This study uses data collected via the spring 2022 administration of the National Survey of Student Engagement (NSSE). NSSE annually collects information from first-year and senior students about their participation in activities that institutions provide for their learning and development. Students at participating institutions are invited to respond to NSSE via an email request that includes a unique link to the online questionnaire. The average institutional response rate in 2022 was 28% (National Survey of Student Engagement, 2023). The dependent variables used in this analysis include NSSE's ten Engagement Indicators and Perceived Gains items. Appendix A contains more information about these variables.

This study also uses data collected from an experimental Tutoring Item Set (see https://hdl.handle.net/2022/29399) that was appended to the NSSE questionnaire administered at 30 institutions. These institutions represent a diverse mix of bach-

elor's-granting public and private colleges and universities, including five minority-serving institutions. The Tutoring Item Set asks about peer tutoring experiences and services available at colleges and universities, students' exposure to tutoring and—importantly—seniors' experiences performing as tutors. We focus exclusively on seniors since they have had more occasions than first-year students to perform as tutors. The questions were designed by tutoring services and tutor training content experts and survey item development experts at NSSE. They are phrased to align with NSSE's emphasis on student behavior and perception. Item validity on the Tutor Item Set benefited from the use of standard stems and response options tested on NSSE.

Respondents

The dataset includes responses from 3,715 seniors. For the purposes of this paper, we created two distinct groups: Seniors who tutored (N = 538) and seniors who neither tutored nor were tutored (N = 3,177). About one-half (49%) of the students were first-generation. The largest proportion of students identified as White (56%), followed by Black or African American (13%), Hispanic or Latina/o (12%), Multiracial (10%), and Asian (3%). Unfortunately, the numbers of peer tutors in some of these groups are too small to conduct reliable statistical comparisons by specific demographic and social identity characteristics.

Data Analysis

Because the NSSE questionnaire and the Tutor Item Set are composed predominantly of close-ended prompts in different formats, we used quantitative approaches to analyze the data. First, we conducted descriptive analysis summarizing the variable frequencies to capture the defining features of the tutoring experience. To estimate the effects of tutoring on peer tutors, we compared seniors who were peer tutors with seniors who did not tutor across a range of dependent variables using a series of t-tests. Partial eta squared is used to measure the effect size of different variables in our ANOVA models and to measure the proportion of variance explained. The dependent variables included NSSE's ten Engagement Indicators (EIs) and Perceived Gains items. More information about the Engagement Indicators, including psychometric properties, can be found here on the NSSE website (https://nsse.indiana.edu/nsse/survey-instruments/engagement-indicators.html).

Results

In this section, we share results of our analysis beginning with a description of the salient features of the peer tutor experience as they relate to principles of effective experiential learning including framing (a structure or place for tutoring and training), interaction, and feedback. Then we compare the outcomes of senior tutors to seniors who did not tutor to assess the impact of the peer tutor experience.

What are the salient features of the peer tutor experience?

Most peer tutors performed as tutors in two settings. About one-third tutored out of an academic support center, and another third did private tutoring (not affiliated with their institution). Of the remainder, 23% worked in a departmental tutoring program, and about 15% tutored in writing or math centers. Only 5% tutored in a student-athlete tutoring program. These percentages total 110 as some respondents tutored in more than one context. Nine of ten tutors did so for courses in their major (90%); almost half (48%) tutored in general education courses outside their major. In addition, 71% of tutors conducted their tutoring in all or mostly in-person formats, and only 8% tutored completely online. As to frequency of tutoring, about two-fifths (38%) tutored only "occasionally" (10 or fewer sessions while attending this institution), while about 30% tutored "moderately" (between 11 and 30 sessions), and 32% tutored "intensively" (more than 31 sessions).

Preparation or training for peer tutoring is considered important for providing effective tutoring (Keller & Porter, 2020). Training is akin to the

Table 1

Comparing Tutors to Non-tutors by NSSE Engagement Indicators.

		Mean	SD	N	M diff	η_P^2
Higher-Order Learning	Non-tutor	41.1	13.69	3177	1.6*	.001
	Tutor	42.6	13.33	489		
Reflective & Integrative Learning	Non-tutor	39.3	12.66	3177	2.0**	.003
	Tutor	41.2	12.56	489		
Quantitative Reasoning	Non-tutor	31.1	16.56	3177	3.8***	.006
	Tutor	34.9	16.17	489		
Learning Strategies	Non-tutor	39.9	14.19	3177	0.1	.000
	Tutor	40.0	14.40	489		
Collaborative Learning	Non-tutor	30.7	15.48	3177	6.7***	.022
	Tutor	37.4	13.98	489		
Discussions with Diverse Others	Non-tutor	39.1	15.90	3177	3.1***	.004
	Tutor	42.2	14.80	489		
Student-Faculty Interaction	Non-tutor	24.3	16.11	3177	9.3***	.037
	Tutor	33.6	16.68	489		
Effective Teaching Practices	Non-tutor	40.9	14.31	3177	1.1	.001
	Tutor	42.0	12.95	489		
Quality of Interactions	Non-tutor	43.1	12.57	3177	0.4	.000
	Tutor	43.5	12.06	489		
Supportive Environment	Non-tutor	33.2	14.32	3177	3.2***	.006
	Tutor	36.4	13.67	489		

*p<.05; **p<.01; ***p<.001

Table 2

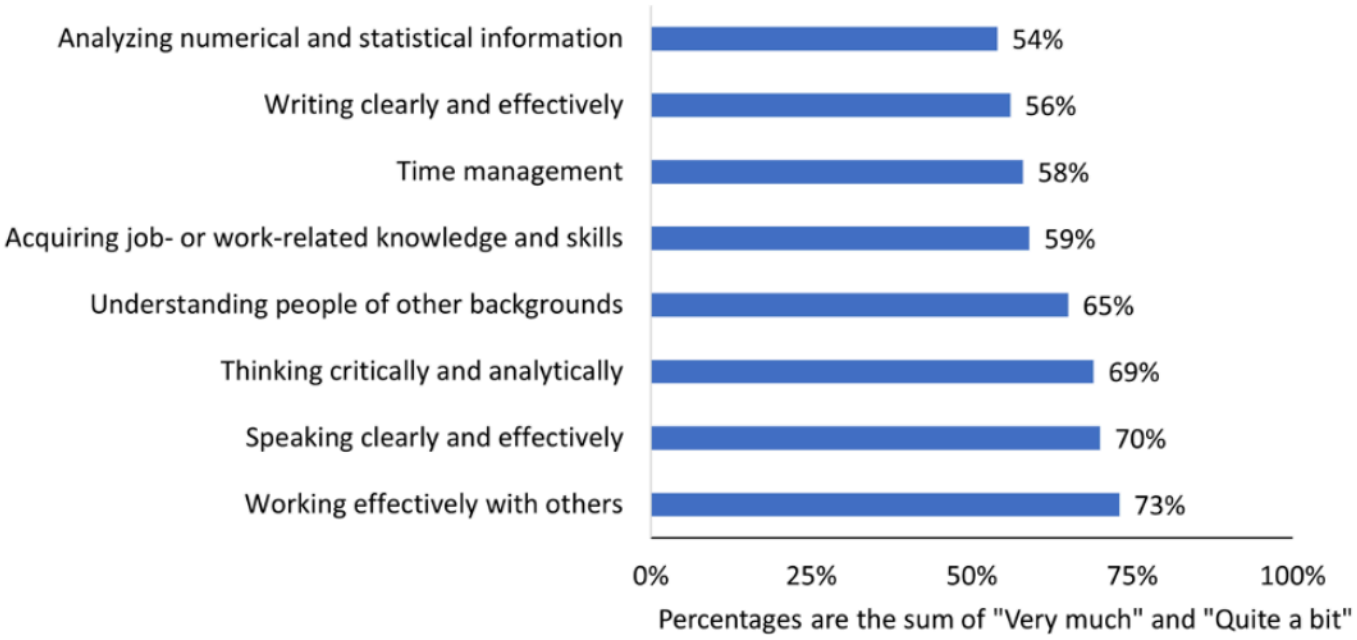
Comparing Tutors to Non-Tutors Estimates of Institutional Contribution to Knowledge, Skills, and Personal Development across Ten Key Learning Gains.

		Mean	SD	N	Mean diff	η_p^2
Writing clearly and effectively	Non-tutor	3.1	0.87	3598	0.1	0.001
	Tutor	3.1	0.9	524		
Speaking clearly and effectively	Non-tutor	3.0	0.91	3598	0.1**	0.002
	Tutor	3.1	0.91	524		
Thinking critically and analytically	Non-tutor	3.3	0.78	3598	0.1**	0.002
	Tutor	3.4	0.74	524		
Analyzing numerical and statistical information	Non-tutor	2.9	0.95	3598	0.2***	0.003
	Tutor	3.1	0.97	524		
Acquiring job- or work-related knowledge and skills	Non-tutor	3.0	0.94	3598	0.1	0.001
	Tutor	3.0	0.93	524		
Working effectively with others	Non-tutor	3.1	0.88	3598	0.0	0.000
	Tutor	3.1	0.87	524		
Developing or clarifying a personal code of values and ethics	Non-tutor	2.9	0.96	3598	0.0	0.000
	Tutor	2.9	1.02	524		
Understanding people of other backgrounds (economic, racial/ethnic, political, religious, nationality, etc.)	Non-tutor	2.9	0.95	3598	0.0	0.000
	Tutor	2.9	0.98	524		
Solving complex real-world problems	Non-tutor	2.9	0.94	3598	0.1*	0.001
	Tutor	3.0	0.93	524		
Being an informed and active citizen	Non-tutor	2.8	0.97	3598	0.0	0.000
	Tutor	2.8	1.01	524		

*p<.05; **p<.01; ***p<.001

Figure 1

Percentage Senior Tutors Indicating "Substantial" Tutoring Contribution to Eight Personal Gains (N = 519).



key experiential learning principle of framing, or how the experience is set up as a learning endeavor (Roberts & Welton, 2022). More than two-fifths (44%) of the peer tutors reported no training or formal preparation. Thirty-seven percent were trained by their institution's tutoring or academic success center with another fifth trained by their major department. Only 5% were certified by the College Reading and Learning Association, Association for the Coaching and Teaching Profession, or Association of Colleges for Tutoring and Learning.

Another key component of effective peer tutoring and experiential learning is getting feedback from supervisors. Indeed, lack of supervision and feedback could limit opportunities for reflection on pedagogical intent. Feedback is also central to the substantive interactions common to high-impact practices done well (Kuh, 2022) and relationships with educators that exemplify relationship-rich college experiences (Felten & Lambert, 2020). More than one-half (53%) of tutors reported receiving at least "some" (very much; quite a bit; or some) amount of feedback from a supervisor to improve their tutoring. Forty-seven percent received very little feedback, no feedback, or did not have a supervisor.

Are senior peer tutors more engaged in effective educational practices compared with their counterparts who never tutored?

Compared with their counterparts, senior peer tutors were significantly more engaged in effective educational practices across the board (Table 1). The strongest relationships were found in four NSSE Engagement Indicators: Student-Faculty Interaction ($p<.001$), Collaborative Learning ($p<.001$), Quantitative Reasoning ($p<.001$), and Discussions with Diverse Others ($p<.001$). Though the effect sizes were small, these areas represent critical dimensions of effective educational practices. Senior tutors were also significantly more engaged in Reflective and Integrative Learning ($p<.01$) and Higher-Order Learning ($p<.05$), as well as perceiving a more Supportive Environment ($p<.001$).

Table 3

Differences in Gains in Knowledge, Skills, and Personal Development for Tutors Receiving Substantial Feedback vs. Minimal to No Feedback.

	Feedback		
Gains[1]	Yes	No	Significant difference
Writing clearly and effectively	82%	70%	***
Speaking clearly and effectively	75%	68%	*
Thinking critically and analytically	88%	82%	*
Analyzing numerical and statistical information	75%	69%	
Acquiring job-or work-related knowledge and skills	76%	66%	**
Working effectively with others	76%	70%	
Developing or clarifying a personal code of values and ethics	70%	56%	***
Understanding people of other backgrounds	70%	60%	**
Solving complex real-world problems	75%	61%	***
Being an informed and active citizen	68%	53%	***

[1] Percent indicating "Very much" or "Quite a bit"

* p<.05, **p<.01, ***p<.001

Do senior peer tutors report higher gains in desired learning and personal development outcomes than their counterparts who never tutored?

Means for the NSSE Engagement Indicator items for tutors and non-tutors are presented in Table 2. These items represent the extent to which their college experience contributed to their development in ten dimensions representing a meaningful, relevant college education. Seniors who tutored had significantly higher gains in "Speaking clearly and effectively" (p<.05), "Thinking critically and analytically" (p<.01), "Analyzing numerical and statistical information" (p<.001), and "Solving complex real-world problems" (p<.05).

Figure 1 shows the percentages of senior peer tutors who reported that their tutoring experience contributed substantially to their knowledge, skills, and personal development. The greatest contribution was to "working effectively with others" (73%),

followed by "speaking clearly and effectively" (70%). Only about half (54%) reported tutoring made a substantial contribution to "Analyzing numerical and statistical information."

Are peer tutors' engagement and learning and personal development outcomes associated with tutoring frequency, tutoring mode (in-person or online), training, and supervisor feedback?

Frequency of tutoring and tutoring mode (in-person or online) were not significantly related to engagement or learning and personal development gains. Training was associated with higher scores on four Engagement Indicators (Student-Faculty Interaction, Effective Teaching Practices, Quality of Interactions, and Supportive Environment) as well as five personal and professional gains items: speaking clearly and effectively, thinking critically and analytically, acquiring job- or work-related knowledge and skills, developing or clarifying a personal code of values and ethics, and being an informed and active citizen (see supplemental table results https://hdl.handle.net/2022/29402).

The more substantive results relating to gains for tutors are associated with feedback (Table 3). Whether trained or not, peer tutors who said they received feedback from supervisors to improve their tutoring reported greater personal and professional gains compared to tutors who received very little to no feedback across 8 of the 10 measures. Those in the "Yes" group were students who indicated that they received at least "Some" feedback, whereas the "No" group were those who indicated "Very little," "None at all," or "Did not have a supervisor." Given the importance of feedback to the experiential learning process, we assigned "Very little" responses to the "No feedback" group, as we considered this level of feedback negligible and not substantive enough to have any positive impact. Overall, 47% of tutors received minimal or no feedback (12.6% none; 6.8% very little; 17.2% no supervisor), and 53% indicated they received at least some feedback.

This pattern of statistically significant findings on nearly every gains item favoring tutors who received substantive feedback further demonstrates the pedagogical intent reflective of tutoring and is consistent with the experiential learning principles of interaction, evaluation, and reflection on performance. In particular, the feedback group reported increased gains in acquiring job-related skills and solving real-world problems, which are both important outcomes of the experiential learning process. Overall, these results lend further credence to the axiom that experiential learning must be done well to be educationally beneficial.

Limitations

As with any study, the findings of this inquiry must be interpreted within certain limitations. For example, while the annual NSSE survey is administered at hundreds of institutions across North America, this study involved only a relatively small subset which amounts to a convenience sample of 30 institutions willing to include the Tutor Item Set appended to the core NSSE survey. Nothing is known about the nature of tutoring services at participating institutions. Perhaps if schools were selected based on their College Reading and Learning Association affiliation or some other criteria (e.g., all peer tutors meet regularly with a supervisor), the patterns of results would differ. Too few peer tutors from various social identity groups made it impractical to determine whether differences existed across engagement and gains variables. Such equity considerations should be emphasized in future research. Finally, the gains representing learning and personal development outcomes are self-reported, so these findings can be presumed evocative and not conclusive absent direct measures of such outcomes.

Discussion and Implications

Taken together, the findings of this study suggest that for senior peer tutors, the tutoring experience is associated with a range of benefits, including higher engagement levels across seven of the ten NSSE Engagement Indicators and greater gains on multiple dimensions of personal and professional development considered important for success during and after college. We set a high bar for examining these latter personal

gains items by featuring the results for only those students reporting that their tutoring experience made a "substantial" ("Very much" and "Quite a bit") contribution to gains in those areas. The differences attributed to tutoring would be even more dramatic if the "Some" amount of contribution response option were added (Appendix B). Notably, tutors attributed their highest gains from tutoring to "working effectively with others." This result is noteworthy because it was not statistically significant in the analysis of institutional contribution to gains. Moreover, it highlights what students valued in their tutor role, and it represents an important experiential dimension of learning with peers that is also consistent with the relationship-rich education approach advocated by Felten and Lambert (2020). Not bad for an experiential activity, especially given that the frequency of tutoring was not related to these desired outcomes.

The findings underscore the importance of interaction with a supervisor—particularly feedback—on tutors' personal and professional development. Indeed, it is worrisome that almost two-fifths of peer tutors either did not have a supervisor or did not receive any feedback about their performance as tutors. Perhaps many students who did not get feedback or supervision were those who engaged in private tutoring not affiliated with a campus office or program. Nonetheless, we should expect that peer tutors be

carefully and thoughtfully trained to perform such roles to ensure peer tutoring exemplifies the qualities of an educationally effective peer interaction.

As colleges and universities strive to involve more students in experiential learning opportunities, and in particular the eleven named HIPs, it is natural to wonder if other things students do during college could be high impact. Tutoring is one of many experiential learning activities that could qualify as a HIP as some have posited (Kuh, 2022; Kuh et al., 2017). One way to explore if tutoring is a HIP is to formally assess tutors' exposure to the eight features essential to HIPs (Kuh & O'Donnell, 2013). Our results offer some insights into this question. Specifically, we see some evidence that tutors have high levels of substantive interactions with faculty and peers, are exposed to diverse perspectives and people, and gain opportunities for reflection, integrative learning, and relevant, real-world application. These results offer preliminary support for labeling tutoring as a HIP, as do Cole, Keller, Kinzie, and Kuh (2023).

In fact, confirmation of peer tutoring as a HIP would require data about peer tutors' academic performance and college completion, information not available for this study. At the same time, the multiple benefits of peer tutoring are noteworthy. Results demonstrating the contribution of tutoring to gains in working with others strengthen the value of tutoring as a formal way to increase meaningful peer interaction and educational support and of learning by doing. Additional examinations of peer tutoring done well (with appropriate training, supervised feedback for tutors, and ample structure reflection) would further reveal engagement and outcome results at an even more impressive level, which would help bolster a claim for qualifying as a high-impact practice.

Future research could focus on identifying strategies for enhancing the tutoring experience, examining the longitudinal effects of tutoring, and exploring the impacts of tutoring on career success and lifelong learning. We also need to dive deeper into the benefits of tutoring for tutees and whether discrepancies exist in the social identity backgrounds of those receiving and benefiting from tutoring. It is quite possible that such discrepancies do exist, as has been reported in the high impact literature (Kuh et al., 2017). Additional inquiries into these areas will broaden and deepen the understanding of peer tutoring as a vehicle for experiential learning and aid higher education institutions, tutoring program administrators, and experiential educators in creating an environment conducive to both tutor and tutee success.

References

Anderson, G. (2021, March 15). As students dispersed tutoring services adapted. Inside Higher Ed. https://www.insidehighered.com/news/2021/03/16/face-face-peer-tutoring-decimated-pandemic-universities-turn-new-tools-times-and

Annis, L. F. (1983). The processes and effects of peer tutoring. Human Learning, 2, 39-47.

Ashwin, P. (2003). Peer support: Relations between the context, process and outcomes for the students who are supported. Instructional Science, 31(3), 159–173.

Astin, A. W. (1993). What matters in college? Four critical years revisited. San Francisco, CA: Jossey-Bass

Bargh, J., & Schul, Y. (1980). On the cognitive benefits of teaching. Journal of Educational Psychology, 72(5), 593-604.

Benware, C., & Deci, E. (1984). Quality of learning with an active versus passive motivational set. American Educational Research Journal, 21(4), 755-765.

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning. Research in Higher Education, 47(1), 1–32.

Cole, J. S., Keller, P., Kinzie, J, & Kuh, G (2023, October 30). Peer tutoring: If done well, could it be a high-impact practice? [Conference Session]. Assessment Institute, Indianapolis, IN, United States.

Colvin, J. W. (2007), Peer tutoring and social dynamics in higher education. Mentoring and Tutoring, 15(2), 165–181

Cruce, T. M., Wolniak, G. C., Seifert, T. A., & Pascarella, E. T. (2006). Impacts of good practices on cognitive development, learning orientations, and graduate degree plans during the first year of college. Journal of College Student Development, 47(4), 365–383.

Dewey, J. (1939). Experience and education (5th ed). New York: The Macmillan & Co.

Felten, P., & Lambert, L.M. (2020). Relationship rich education: How human connections drive success in college. Baltimore: Johns Hopkins University Press.

Goldman, C. (2012). A cohort based learning community enhances academic success and satisfaction with university experience for first year students. Canadian Journal for the Scholarship of Teaching and Learning, 3(2), 1–19.

Keller, P., & Porter, H. (2020). A terminological study of peer education in higher education [White paper]. College Reading & Learning Association. https://crla.net/images/whitepaper/CRLA_2020_WhitePaper_Peer_Ed_FA.pdf

Kim, E., Park, J. & Cozart, J. (2016). Affective and motivational factors of learning in online mathematics courses. British Journal of Educational Technology, 47(3), 499-510.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Englewood Cliffs, NJ: Prentice Hall. http://academic.regis.edu/ed205/Kolb.pdf

Kuh, G. D. (1993). In their own words: What students learn outside the classroom. American Educational Research Journal, 30(2), 277-304.

Kuh, G. D. (1995). The other curriculum: Out-of-class experiences associated with student learning and personal development. Journal of Higher Education, 66(2), 123-155.

Kuh, G. D. (2003). What we're learning about student engagement from NSSE: Benchmarks for effective educational practices. Change: The Magazine for Higher Learning, 35(2), 24-32.

Kuh, G.D. (2008). High-impact educational practices: What they are, who has access to them, and why they matter. Washington, DC: Association of American Colleges and Universities.

Kuh, G.D. (2022). Afterword: The HIPs just keep coming! In J. Zilvinskis, J. Kinzie, J. Daday, K. O'Donnell, and C. Vande Zande (Eds.). Delivering on the promise of HIPs. Sterling, VA: Stylus.

Kuh, G.D., Citty, J., Hudson, J.E., Jr., Iruoje, T., Mladic, J., & Qureshi, S. (2021). Right before our eyes: Making peer interaction matter more for all students. Change: The Magazine for Higher Learning, 53(4), 15-21.

Kuh, G.D., & O'Donnell, K. (2013). Ensuring quality and taking high-impact practices to scale. Peer Review, 15(2), 32.

Kuh, G.D., O'Donnell, K., & Schneider, C.G. (2017). HIPs at ten. Change: The Magazine of Higher Learning, 49(5), 8-16.

Mayhew, M. J., Rockenbach, A. N., Bowman, N. A., Seifert, T. A., Wolniak, G. C., Pascarella, E. T., & Terenzini, P. T. (2016). How college affects students: Vol. 3. 21st century evidence that higher education works. San Francisco: Jossey-Bass.

McMillan, J. H., & Schumacher, S. (2001). Research in education: A conceptual introduction. New York: Longman.

Miller, A. L., Sarraf, S. A., Dumford, A. D., & Rocconi, L. M. (2016). Construct validity of NSSE engagement indicators (NSSE psychometric portfolio report). Bloomington, IN: Center for Postsecondary Research, Indiana University, School of Education. http://nsse.indiana.edu/pdf/psychometric_portfolio/Validity_ConstructValidity_FactorAnalysis_2013.pdf.

Moore, R., & LeDee, O. (2006). Supplemental Instruction and the performance of developmental education students in an introductory biology course. Journal of College Reading and Learning, 36(2), 9–20.

National Survey of Student Engagement. (2007). Experiences that matter: Enhancing student learning and success. Bloomington, IL: Center for Postsecondary Research.

National Survey of Student Engagement. (2023). NSSE 2023 Overview. Bloomington, IN: Center for Postsecondary Research, Indiana University, School of Education. https://nsse.indiana.edu/nsse/reports-data/nsse-overview.html.

Ogden, P., Thompson, D., Russell, A., & Simon, C. (2003). Supplemental instruction: Short- and long-term impact. Journal of Developmental Education, 26(3), 2–6.

Pascarella, E.T., & Terenzini, P.T. (2005). How college affects students: A third decade of research (Vol. 2). San Francisco, CA: Jossey-Bass.

Preszler, R. W. (2009). Replacing lecture with peer-led workshops improves student learning. CBE—Life Sciences Education, 8(3), 182–192.

Roberts, J. & Welton, A. (2022, August 2). The ten commandments of experiential learning. Inside Higher Education. https://www.insidehighered.com/advice/2022/08/03/foundational-best-practices-experiential-learning-opinion

Topping, K. J. (2018). Trends in peer learning. Educational Psychology, 25(6), 631-645.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: President and Fellows of Harvard College.

Wurdinger, S. D., & Carlson, J. A. (2010). Teaching for experiential learning: Five approaches that work. Lanham, MD: Rowman & Littlefield Education.

Zhao, C. M., & Kuh, G. D. (2004). Adding value: Learning communities and student engagement. Research in Higher Education, 45(2), 115–138.

Appendix A

Dependent Variables

Engagement Indicators (EIs) were created with a blend of theory and empirical analysis (https://nsse.indiana.edu/nsse/survey-instruments/engagement-indicators.html#:~:text=Intraclass%20Correlation%20Coefficients%20by%20Class%20Level%20%28NSSE%202020%29,%20%203.0%25%20%209%20more%20rows%20).The indicators include:

a) higher-order learning (4 items; Cronbach's α = .85 first-year, .86 senior)

b) reflective and integrative learning (7 items; Cronbach's α = .87 first-year, .88 senior)

c) quantitative reasoning (3 items; Cronbach's α = .85 first-year, .87 senior),

d) learning strategies (3 items; Cronbach's α = .77 first-year, .78 senior)

e) collaborative learning (4 items; Cronbach's α = .81 first-year, .80 senior)

f) discussions with diverse others 4 items; Cronbach's α = .89 first-year, .90 senior)

g) student-faculty interactions (4 items; Cronbach's α = .83 first-year, .85 senior)

h) effective teaching practices (4 items; Cronbach's α = .85 first-year, .87 senior)

i) quality of interactions (5 items; Cronbach's α = .84 first-year, .81 senior)

j) supportive environment (8 items; Cronbach's α = .89 first-year, .89 senior).

All Engagement Indicators are scored from 0 to 60 with zero indicating no engagement and 60 indicating very high engagement. These scales show acceptable levels of internal consistency (McMillan & Schumacher 2001) with previous research suggesting sufficient evidence for construct validity with exploratory and confirmatory factor analyses (Miller et al., 2016).

Appendix B

Percentage of Senior Tutors Indicating Tutoring's Contribution to Eight Personal Gains (N = 519)

To what extent has peer tutoring contributed to your knowledge, skills, and personal development in the following areas?	Very much	Quite a bit	Some	Very little	Not at all
a. Time management	29.9%	28.1%	26.0%	9.8%	6.2%
b. Writing clearly and effectively	30.4%	25.4%	21.6%	13.5%	9.1%
c. Speaking clearly and effectively	39.5%	30.6%	17.0%	7.3%	5.6%
d. Thinking critically and analytically	38.7%	30.6%	18.6%	7.4%	4.8%
e. Analyzing numerical and statistical information	31.0%	22.7%	22.5%	13.5%	10.2%
f. Acquiring job-or work-related knowledge and skills	33.7%	25.2%	20.4%	12.1%	8.7%
g. Working effectively with others	45.1%	28.1%	16.4%	6.2%	4.2%
h. Understanding people of other backgrounds	37.8%	26.8%	19.1%	8.5%	7.9%

Dr. James Cole is the Associate Research Scientist and the Project Director for the Beginning College Survey of Student Engagement. His research interests include new student experiences, academic difficulty, and student success.

After 25 years of experience in higher education, specializing in learning assistance and peer education, Page Keller joined the team at Knack Technologies, Inc. where she serves as Vice President of Academic Relations. Keller's career encompasses research, writing, and practice advocating for peer education as a high-impact practice.

Dr. Jillian Kinzie is Associate Director, National Survey of Student Engagement (NSSE) at the Indiana University Center for Postsecondary Research. She conducts research and leads project activities on effective use of student engagement data to improve educational quality, and is co-author Delivering on the Promise of High-Impact Practices: Research and Models for Achieving Equity, Fidelity, Impact, and Scale (2022).

George D. Kuh is Chancellor's Professor Emeritus of Higher Education at Indiana University. He is the founding director of IU's Center for Postsecondary Research, the National Survey of Student Engagement, and the National Institute for Learning Outcomes Assessment.