The Influence of Experiential Learning on Student Professional Development: A Literature Review

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Abstract

This literature review examines the influence of experiential learning through student organization involvement on students' professional development and career expectations. Prior to students' transition into the workforce, their socialization into the engineering profession can be shaped by involvement in experiential learning, including student organizations. Previous research has established a breadth of benefits of involvement in student organizations, yet the mechanisms of its influence are less clear, as are the types and extent of involvement that lead to such benefits. Thus, the objective of this review is to further investigate how involvement has been measured and conceptualized in research studies, with a focus on the differential effects of involvement amongst different student populations.

This paper investigates the following research questions: (1) How have forms of involvement been measured and conceptualized in studying the impact of undergraduate students' out-of-class experiences on their professional development; (2) what mechanisms have been proposed to explain the impact of experiential learning in student organizations on students' professional development; and, (3) how do participation rates and effects of experiential learning vary across different undergraduate engineering student populations (e.g., gender, race/ethnicity, discipline, socioeconomic status)?

Employing a narrative literature review approach, this paper synthesizes current research in engineering education and higher education on experiential learning for undergraduate students, and proposes areas for future research. This review illustrates the challenges in measuring aspects of student involvement, suggesting salient characteristics of involvement that future research might investigate, and identifies types of mechanisms that have been attributed to the influence of involvement, including developing skills, networking with peers, fostering sense of belonging and identity, and encouraging career-related reflection. This review provides insight into the nuance of the breadth of students' experiences in student organizations to inform future work examining the contextual influence of experiential learning on engineering students' professional development.

Introduction

Engineering education programs aim to prepare graduates to transition into the 21st century workforce as professional engineers with a breadth of technical and interpersonal skills and a sense of professional responsibility. Multiple competing influences have contributed to engineering education's current overcrowded curriculum, which largely focuses on technical knowledge [1]. This technical focus is increasingly being questioned amidst calls for twenty-first century professional skills, including critical thinking, creativity, communication, leadership, professionalism, and life-long learning [2], [3]. Villanueva and Nadelson [4] recently surveyed undergraduate engineering students about their perceptions of the engineering profession to investigate whether "we are preparing our students to become engineers of the future or the past?".

They found that many students' self-reported levels of professional identity were greater than their communicated levels of professional identity which the researchers coded using a STEM professional identity model. The researchers further concluded that many students' perceptions and definitions of engineering did not align with the National Academy of Engineering's description of the Engineer of 2020 [2]. They concluded that students need additional intervention to help increase their professional understanding and preparation in alignment with a 21st century understanding of engineering that recognizes the complexities of professional identity and humanistic-social needs. Moreover, students' identification with engineering is critical to their persistence in the engineering workforce [5]. One pathway for increasing identification with engineering is by engaging with experiential learning through student organizations [6].

Experiential learning through student organization involvement provides an avenue for students' professional development in preparation for their transition to the workforce. Extracurricular involvement connects students to networks of peers and mentors [7], [8], can increase students' sense of belonging in their discipline [8], [9], and provides socialization experiences that inform career planning and development [10], [11]. Student organization involvement can provide opportunities for students to tailor their educational experiences to their personal interests and career aspirations. Moreover, students' experiences in out-of-class activities encompass a significant part of their time as undergraduates [12], and it is important for educators to understand how students make meaning of these experiences. Thus, this literature review synthesizes current research on engineering undergraduate students' out-of-class involvement to illustrate current understanding of the impact of these experiences and highlight areas for future research. Other reviews of student organization involvement have synthesized the breadth of outcomes associated with involvement in various areas [13]–[16]. Yet, while research recognizes the positive impact of experiential learning and student organization involvement, the mechanisms of its influence are less clear, as well as what types and extent of involvement lead to such benefits [17]. Thus, this review further investigates how involvement has been measured and conceptualized in research studies, with a focus on the differential effects of involvement amongst different student populations.

Research Questions

The following research questions guided our review:

RQ1: How have forms of involvement been measured and conceptualized in studying the impact of undergraduate students' out-of-class experiences on their professional development?

RQ2: What mechanisms have been proposed to explain the impact of experiential learning in student organizations on students' professional development?

RQ3: How do participation rates and effects of experiential learning vary across different undergraduate engineering student populations (e.g., gender, race/ethnicity, discipline, socioeconomic status)?

Methods

This literature review employs a narrative literature review approach to synthesize research in engineering education and higher education on experiential learning for undergraduate students [18]. A narrative literature review synthesizes research findings through a narrative overview that identifies patterns and trends in the literature. We searched the following databases to identify a selection of engineering, education, and engineering education research journals: EBSCO: Education Source, EBSCO: ERIC, and Scopus. Education Source is a broad source of education journals, including the *Journal of Engineering Education, International Journal of Engineering Education, Research in Higher Education,* and the *Journal of Professional Issues in Engineering Education*. ERIC also indexes books and articles on education, including the *Journal of STEM Education* and the *Journal of College Student Retention*. Scopus provides the largest source of abstracts and citations of peer-reviewed journals, including the *Journal of Women and Minorities in Science and Engineering*. This selection of databases searches a variety of engineering, education, and engineering education research to broadly capture the scope of work and current knowledge of engineering undergraduate out-of-class experiences. We iteratively built the search string to capture a breadth of research on out-of-class experiences for undergraduate (engineering) students. The following search terms were utilized to identify research on out-of-class experiences: *co-curricular, extracurricular, student organization,* and *out-of-class*. To narrow the results to undergraduate students, we used the following search terms: *undergrad*, college*, universit*, institut*, campus*, bachelor**. Additionally, we identified studies specific to engineering students by including the additional key word *engineer*; however, we did not limit this review to these articles and have also included studies of undergraduate students that include both engineering and non-engineering majors given the breadth of theory and findings about undergraduate extracurricular involvement that could be generalized to engineering student populations.

The above terms were used to search the abstract, title, and subject/keyword fields in the databases. Furthermore, the results were sorted to include only peer-reviewed journal articles in the United States. Including only studies conducted in the United States controls the scope of the review given varied forms of post-secondary education globally. Publication date was restricted to include only studies published between 2000 and 2020, given the influence of EC2000 on conceptualizing and researching student outcomes [19], [20]. Additionally, we searched the online contents of the following journals, using the above specified keywords related to out-of-class experiences: *Research in Higher Education, Journal of College Student Development, Journal of Engineering Education, Journal of Women and Minorities in Science and Engineering*. We employed forward and backward citation searches to find additional relevant articles for this review. Following these procedures, 99 studies met inclusion criteria and were downloaded for full-text review. 35 of these articles were removed from the review for the following reasons: the study was not about out-of-class activities; the study focused on pre-college involvement; the outcome investigated was out of scope of the review (e.g., grade point average); or, the article was purely descriptive in nature and did not examine any outcomes of involvement or mechanisms of influence. 64 articles remained for analysis in this literature review.

We initially reviewed and analyzed articles in this analysis by noting the following components for each study: Population; Problem/Research Question; Intervention/Independent Variable; Outcome/Effect; and, Type of Study/Methods/Data. These components follow PRISMA's

preferred reporting items [21]. In line with the stated research questions for this review, we also noted the following for each study: type of out-of-class experience studied; participant demographics; evidence of differentiated experience (by gender, race/ethnicity, socioeconomic status (SES), and engineering discipline); and, suggested future work. As part of our analysis, we listed each of the components, which assisted comparison across studies to identify themes and trends in the research. We reviewed the studies again to add further detail to further explore initial observations and develop identified themes. In this second pass, we focused on the studies' conceptualization of out-of-class involvement, proposed mechanisms of their impact, and discussion of participant demographics and any differences identified by gender, race/ethnicity, or SES. In the third and final pass, we focused on reading for details related to themes identified in the initial analysis, including discussion of the conceptual framework and patterns in types of out-of-class involvement.

Findings and Discussion

Professional Development Outcomes Associated with Student Organization Involvement. Researchers have defined and examined student outcomes impacted by out-of-class experiences in a variety of ways. In the realm of professional development, these outcomes range from intellectual and competency development to value constructs (e.g., ethics, professional responsibility, sustainability affect) and constructs of self-efficacy and professional identity (including sense of belonging, work self-efficacy, and identification with the engineering profession). For example, researchers have studied intellectual development outcomes of involvement that include the development of critical thinking skills [22], [23], cognitive skills [24], analytical skills [25], interdisciplinary skills [26], deep learning [27], and decision making [28]. Researchers have also considered an increasingly broad range of interpersonal development outcomes, which have often been theorized as mediated by peer interactions [29]–[31]. These outcomes include communication skills [13], [32], interpersonal skills [28], [33]–[35], multicultural skills and understanding [36]–[38], identity development [36], [39], [40], empathy [30], and leadership development [32], [37], [41]–[46]. This review includes studies of student development across this range of intellectual and interpersonal development outcomes, which are often considered in conjunction as twenty-first century skills necessary for graduates [2], [3].

In addition to considering skill development outcomes, many researchers have investigated the role of involvement in providing students with networks of support and a sense of belonging, which are critical to their persistence and professional identification [8], [38], [39]. Involvement has been shown to support students' persistence in engineering by supporting sense of belonging [8], supporting goals and integration [47], [48], and helping develop emergent resistant capital toward success in engineering [7]. Additionally, experiential learning through student organization involvement can introduce students to the engineering profession prior to full-time employment and help these students formulate career plans and prepare for their transition to the workforce [10], [11]. These pre-graduation socialization experiences can inform students' expectations and perceptions of engineering careers [6].

Involvement outcomes for engineering students. In studying the influence of involvement in student organizations for engineering students specifically, many studies have explicitly connected

the outcomes studied to ABET criteria or to the professional skills and attributes described in the National Academy of Engineering's Engineering of 2020 Report [2], [25], [26], [32], [44], [49], [50] . These outcomes-based criteria govern the accreditation of U.S. engineering programs and consist of a variety of technical and professional skills. It is not clear that engineering students' choice or perception of involvement in student organizations would be uniquely influenced by consideration of these outcomes compared to non-engineering students; however, these specified outcomes may shape the context of engineering student involvement by influencing the programming and evaluation of engineering-specific student organizations. In addition, previous studies have found distinct cultures of engagement between engineering/natural sciences and humanities/social sciences majors, with more focus on interaction and participation in humanities/social sciences compared to greater focus on quantitative and work force skills in engineering/natural sciences [51].

RQ1: How have forms of involvement been measured and conceptualized in studying the impact of undergraduate students' out-of-class experiences on their professional development?

Challenges in investigating the effects of involvement on development. The general and broad nature in which involvement has often been investigated may explain in part the relatively modest effect sizes associated with involvement in quantitative studies. Some types of experiences can be more educative than others [52], [53], and different students may benefit differently from a given experience or involvement [32]. Researchers have noted growing consensus regarding the value of involvement in student organizations; however, there is less clarity around the magnitude of this value and the extent of involvement that achieves it [17], [28]. In response to these questions, studies of involvement in student organizations have begun to examine various aspects of participation through different lenses and methods.

Measuring student development: self-reported versus direct measures. Studies of student involvement have varied in their methods for assessing development in relation to involvement in student organizations. Many studies have relied on self-reported measures of skill or gain; however, a few studies have captured direct measures of cognitive skills through assessments [22], [23]. Interpersonal development outcomes pose an even greater challenge for direct measurement. Rubin, Bommer, and Balwin [28] employed a unique approach by using a campus assessment center to gather behavioral assessments of participants' interpersonal skills in a series of group exercises. Students were rated on four interpersonal dimensions: oral communication, decision-making, teamwork, and initiative. The researchers found that involvement in student organizations was most associated with higher levels of interpersonal skills compared to other activities or no involvement.

More commonly, researchers have correlated self-reported measures of skills or gains with students' involvement. While researchers have justified the use of these measures as an appropriate proxy for direct measurement in given circumstances [54], findings from self-reported data must be carefully interpreted to consider the context and type of questions for self-report. In analyzing parallel measures of longitudinal measures and self-reported gains for 8,476 first-year students at 46 institutions, Bowman [55] found weak correlation between students' longitudinal changes and self-reported gains. These findings support the conclusion that individuals tend to overestimate the

extent to which their skills have changed, yet underestimate how much their attitudes have changed [16]. However, self-reported data do tend to reflect the patterns found in the relationships between student experience and directly assessed cognitive outcomes [56], and self-reported gains can be useful for measuring affective outcomes and for capturing students' perceptions of their development [57]. Furthermore, self-reported gains may provide a better measure of development in areas where respondents may have a change in frame of reference with respect to their ability (e.g., leadership development) [41]. In this case, potential response-shift bias warrants the use of retrospective, self-reported gain questions.

Measuring quantity and quality of involvement. Interpreting findings about the influence of involvement is further complicated by the general nature in which involvement in student organizations is often measured. Involvement is frequently captured as a binary variable indicating participation or not; however, several studies have noted Astin's specification of quality and quantity in his theory of involvement and sought to capture some extent of involvement in reflection of quality and/or quantity. Common extensions of the participation variable seek to measure some aspect of frequency or time allocated to involvement in student organizations [42], [58]. For example, Foreman & Retallick [42] analyzed students' leadership development with respect to the number of organizations in which they participated, the average number of hours per week they reported spending in clubs and organizations, and whether they held a leadership role in any clubs. Additionally, the College Student Experiences Questionnaire [59], which later informed the National Survey of Student Engagement [12], incorporated questions about the quality of students' experiences in student organizations. Many studies have drawn upon these survey instruments to understand students' experiences [24], [52], [60].

Studies have increasingly examined quality of involvement in investigating the impact of student involvement. For instance, holding a leadership position in a student organization has been consistently associated with greater gains relative to general involvement [28], [61], [62]. Other studies have also measured quality of involvement by surveying students about the types of experiences they have had through involvement in student organizations (e.g., led a discussion, planned an event, analyzed data, hosted a speaker) [17], [37]. Vetter et al. [17] found this measurement of quality of involvement to be a greater predictor of their model of student thriving development than that of quantity of involvement (measured in terms of hours per week involved in student organization activities). In addition, Flowers [52] and Soria et al. [37] analyzed the distinct effects of various measured experience on students' development, concluding that certain experiences had larger effects on development than others. Soria et al. [37] found a number of student organization experiences to be predictive of leadership development, including chairing a meeting, planning an event, leading a discussion, and recruiting new members. Additionally, a few experiences were significantly associated with multicultural competence development, including promoting an event and engaging in in-depth discussion about local, state, national, or international issue. Differences in the types of experiences and outcomes surveyed in these studies prevent meaningful comparison between these studies; however, both illustrate the complexity in capturing the nature and influence of students' involvement.

Another approach of measuring involvement consists of creating indices of involvement for analysis by combining responses to various questions about experiences in student organizations and types of involvement. Approaches for calculating these indices vary widely. For example, Huang & Chang [24] measured involvement as the sum of reported frequency of involvement (ranging from 'not at all' to 'very often') in different aspects of activity (e.g., attended class, took detailed notes in class, participated in student club activities, served on a committee of the club, participated in departmental activities). Similarly, Rubin, Bommer, and Balwin [28] combined students' responses about involvement in a student organization, fraternity/sorority, or sports team and involvement in an officer position in any of these organizations. These indices likely captured students' breadth of involvement more so than the extent of their involvement, since students may be involved in more than one organization, which these indices do not capture.

In studying the extent of students' involvement, studies have also explored questions about potential upper bounds to the level of beneficial involvement. Threshold theories of student involvement predict diminishing or negative returns at higher levels of involvement. These studies have measured level of involvement as either number of activities or number of hours involved in activities [58], [63], [64]. These studies fit nonlinear functions of involvement with respect of academic outcomes, finding that at high levels of involvement the benefits leveled off or even declined slightly. Vetter et al.'s [17] findings about the significance of quality of involvement over quantity of involvement echo these findings, concluding that "co-curricular programs and activities are of greatest benefit when they encourage students to engage more deeply… only one or two meaningful co-curricular involvement experiences may be needed to facilitate student success" (p. 47).

Types of student organizations. Beyond the extent of involvement in student organizations and the types of activities in which students participate through these organizations, some studies have examined the types of organizations in which students are involved. These classifications range from broad categories of academic versus non-academic organizations [26], [34] to detailed lists of 6-20+ varieties of involvement (e.g., pre-professional, service, music, culture) [29], [42], [65], [66]. Holzweiss, Rahn, & Wickline [34] investigated students' motivation for participating in academic versus non-academic student organizations and the benefits they perceived from their involvement. The researchers analyzed open- and close-response answers to a survey completed by 354 undergraduate students at a large research institution. Slightly more than half of the involved participants reported involvement in only non-academic organizations (52%), with the remaining involved participants split evenly between reporting involvement in only academic organizations (23%) and reporting involvement in both types of organizations (25%). Students reported primarily career-driven or future-focused motivation for joining academic organizations in contrast to more present-focused motivation for joining non-academic organizations, including personal interest and meeting new people. They associated involvement in academic organizations with discipline-specific knowledge development, while involvement in non-academic organizations was most associated with general skill development, including interpersonal communication skills, leadership skills, and general business skills.

Similarly, in reviewing literature on students' out-of-class involvement, Simmons et al. [13] found that academic activities were associated more with career and professional development, while non-academic activities were associated with academic and social engagement outcomes. These findings on perceived development are further supported by Simmons et al.'s [65] survey of 816 undergraduate engineering students. These engineering students reported that the primary reasons for their participation in student organizations were to fulfill personal interests and to gain experiences. The most reported positive outcomes of involvement were personal development, social development, and social engagement. Additionally, students reported their top involvement based on perceived outcomes. The top five reported involvement types were job; sports; design competition team; culture, faith, gender, and identity; and professional experiences (e.g., internships). The variety in these top activities illustrates a range of engineering student involvement focused on both engineering and non-engineering involvement. Other studies have affirmed distinct benefits of non-engineering versus engineering-related involvement for engineering students [26], [32]. Lattuca et al. found participation in non-engineering clubs or humanitarian engineering projects to be significantly associated with students' interdisciplinary skill development. The researchers suggested the benefits of students interacting with students in non-engineering majors through these activities.

Typologies of involvement. Student typologies provide an additional approach to investigating the distinct effects of involvement for different students [29], [67]–[71]. These approaches consider student subcultures by classifying students according to common characteristics, including types of involvement [72]. Researchers have further linked student typologies to differences in self-reported development [70]. Contradicting some previously discussed findings, these studies have concluded that students involved in a wide range of activities report greater development than those involved in more narrowly focused or fewer activities [68], [70], [72]. Hu and McCormick [68] conducted a cluster analysis to create their typology, using students' responses to the engagement questions on the National Survey of Student Engagement (NSSE) at 18 institutions to form the clusters. They identified seven clusters or student types and analyzed how these student types related to various development outcomes, including critical thinking, well-being, and leadership development. The group of students most engaged according to the NSSE benchmarks (termed the Maximizers) also had the highest development scores. Conversely, the Disengaged group had the lowest scores on average. The researchers identified distinct patterns of engagement and outcomes across each grouping.

In another approach to developing a student involvement typology, Dugan's [29] taxonomy focused specifically on students' involvement in student groups and organizations to classify students into eight distinct subgroups. These subgroups were determined by patterns of involvement using three latent factors. These factors differentiated between greater involvement in identity groups versus sports, arts versus career-focused groups, and college-associated (e.g., campus programming, student transition, student government) versus diffuse involvement (i.e., low levels of involvement in unrelated activities). For example, the Affinity Group Affiliates group had the highest levels of involvement in identity groups. Students of color and women were overrepresented in this group. Academic Careerists was the largest group with 24 percent of respondents classified in this category. These students had average levels of involvement and

tended toward involvement in arts and cultural groups and career-focused groups with more diffuse experiences. Dugan's taxonomy is unique in its focus on student group experiences. Accordingly, he described it as a "true peer interaction model" (p. 242). However, he did not examine any outcomes or differences in outcomes based on subgroup membership.

Significant contextual variables. The studies in this review varied in the extent and breadth of contextual variables included in their respective models of the influence of involvement on development outcomes. It is important to carefully select and specify relevant covariates to control for potential confounding influences [25]. The correlational nature of these studies must be emphasized in interpreting findings. Selection bias likely influences many of the results as students self-select which organizations they join and their level of involvement. Appropriate selection of covariates (and propensity score analysis) may also help mitigate some of the selection bias inherent in these observational studies [61]. Commonly included covariates include race, gender, socioeconomic status, pre-college achievement, year in school, and major [16]. Pre-college skill levels and involvement experiences have been shown to be predictive of college developmental gains [37], [73], yet they are only infrequently included in these analyses (Mayhew et al., 2016). Institutional context has also been shown to influence the availability and culture of involvement for students [43], [74], [75].

RQ2: What mechanisms have been proposed to explain the impact of experiential learning in student organizations on students' professional development?

Theories and mechanisms of how involvement influences students' experiences and development. Many of the studies in this review conceptualized involvement and student outcomes through a "college impact model" conceptual framework, often citing Astin [76] and Terenzini & Reason [77]. These frameworks conceptualize student development outcomes as a product of students' pre-college characteristics and experiences and their college experiences both in-class and out-of-class. These studies thus controlled for various aspects of student experience, including student discipline and curricular emphases, and model outcomes with respect to students' involvement in various types of out-of-class involvement; yet, they did not specify what about students' involvement may have led to such outcomes.

Quality of effort has also been viewed as a mediator between involvement and development [59]. As described above, quality of effort has been conceptualized in a variety of ways, accounting for the time and energy that a student invests in the experience [60]. Student organizations can provide opportunities for students to practice skills in authentic environments [78]. By this mechanism, student organization involvement influences students by supporting the development of skills and competencies [79]. For instance, Hinkle and Koretsky [80] examined how student activities in student organization aligned with professional practice and contributed to their professional formation. They found that student organizations provided various forms of informal learning opportunities for students to practice sociotechnical skills, such as decision-making and communication.

Other studies have drawn on Astin's theory of involvement [69] to attribute the developmental influence of involvement to peer interactions, which Astin concluded to be the greatest source of

influence on students development in college. Peer interactions can contribute to processes of socialization [29] and also provide networks of support and opportunity for cross-cultural interaction [37], [38], [40]. Student organizations can create subcultures within the broader college context [29], [31], [81]. These environments and experiences can contribute to students' identity development, which can inform other outcomes [36].

Some studies have additionally considered the influence of involvement in student organizations on students' sense of belonging, suggesting that sense of belonging is a necessary prerequisite for other development outcomes, particularly for minoritized students [8], [38], [39]. For example, Banda & Flowers III [8] modified Astin's theory of involvement in their study to better account for the nuance of minoritized students' experiences in institutions and student organizations by emphasizing students' sense of belonging in these spaces. Additionally, Revelo & Baber [7] advocated for the use of anti-deficit frameworks when studying student involvement amongst diverse populations, drawing from Yosso's [82] community cultural wealth (CCW) theoretical framework to guide their study of how Latinx engineering students developed emergent resistant capital through their involvement in student organizations. These anti-deficit frameworks center the assets and resilience that minoritized groups use to succeed in STEM, which can be supported through communities of involvement in student organizations.

Qualitative studies of students' involvement provide further insight into the nature of the impact of these experiences on students' professional development and career decision-making. For example, Brown [83] describes how students' career decision-making was influenced by key experiences and interactions they had through involvement in student organizations and other areas. Students described how various experiences gave them a new perspective, introduced them to new interests, prompted self-reflection, and connected them to opportunities. Smith and Gayles [6] also interviewed a group of women engineering students about their career decision-making. These students described how campus involvement in student organizations and other programs increased their commitment to the engineering profession and helped them build networks with campus personnel, employers, and alumni.

RQ3: How do participation rates and effects of experiential learning vary across different undergraduate engineering student populations (e.g., gender, race/ethnicity, discipline, socioeconomic status)?

Differences in participation rates and the effects of involvement. A number of the studies in this review did not explicitly account for or investigate differences in student experiences by gender, race/ethnicity, discipline, socioeconomic class, or other individual characteristics; yet, those that did described several significant distinctions in how students engaged in experiential learning through student organizations and the outcomes of this involvement. For example, Ro & Knight [32] found that women's involvement in non-engineering clubs and in engineering clubs specifically for women or URM was associated with greater self-reported contextual competence and communication skills. Ro & Knight emphasized the significant interaction effects between gender and student experiences, and they advised future studies to account for these interaction effects by demographic characteristics in analyses. Similarly, the Final Report of the Women's Experiences in College Engineering [84] indicated that women who persisted in engineering were

more likely to participate in all types of support activities than women who left engineering. Social enrichment activities (e.g. field trips, guest speakers, engineering social events, and engineering society events) were significantly associated with staying in engineering, even after controlling for change in self-confidence and perception of department environment. Involvement in organizations outside of students' majors may have a distinct role for many engineering students given the predominantly male representation and often vocational focus of engineering education.

Student organization involvement can provide support networks and cultural capital to minoritized students, particularly those attending predominantly White institutions. Several studies have demonstrated how Latinx-based organizations can provide support and family-like environments for Latinx students [7], [8], [43], [86]. Luedke [86] described how students gained social capital through their involvement that supported their career planning and networking with employers. Banda and Flowers III [8] noted that most of their participants described the support and sense of belonging they received through involvement in identity-based student organizations. Identity-based organizations also provide venues for support, cultural expression, advocacy, and leadership and identity development for Black students [36], [46], [81]. Museus [81] interviewed Asian American and Black students at a predominantly White institution, finding that racial and ethnic organizations served three main functions for these students: providing cultural familiarity, cultural expression and advocacy, and cultural validation. Student organizations provide a subculture (or counter-space) within the institution for students, supporting their persistence and personal development. Kodama and Laylo [88] explain that identity-based student organizations uniquely contribute to students' leadership development by challenging perceptions of leadership as White and male and supporting identity development and leadership self-efficacy.

Additionally, studies of first-generation college students have described how student organizations create a sense of belonging and help students navigate campus structures [39], [87]. Simmons and Martin [87] describe how peers and student organizations can provide fictive kin for first-generation college students to support their sense of belonging and confidence and persistence in engineering. First-generation college students in Means and Pyne's [39] study also described how student organizations provided academic support and sense of belonging. Furthermore, Simmons & Groen [85] emphasized the importance of out-of-class activities for groups traditionally underrepresented in engineering (including women and other minority groups), describing how this "hidden curriculum" has been shown to promote persistence toward graduation and engineering workforce participation for these individuals.

Experiential Learning in Student Organizations in Relation to Internship and Co-op Experiences. Several of the studies in this review considered both involvement in student organizations and internships/co-ops in their analyses. The following section summarizes their findings about the outcomes of each of these types of experiences. These studies have found both student organization involvement and internship/co-op participation to be significant variables associated with professional development outcomes. For example, in examining engineering students' learning outcomes related to ABET Criterion 3, Strauss and Terenzini [25] concluded that both internships and involvement in on-campus experiential learning (engineering design competitions or student chapters of professional societies) made statistically significant and unique

contributions to students self-reported skill development. Similarly, in surveying students about their learning outcomes related to the Engineering of 2020 Report, Carter et al. [61] and Knight and Novoselich [44] found both involvement in student organizations and internship experiences to provide distinct contributions to students self-reported development in teamwork, communication, and leadership. Congruent with these quantitative findings, qualitative studies have also demonstrated the mutual benefit of involvement and internship/co-op experiences. In interviewing women engineering students about their career decision-making, Smith and Gayles [6] found that students pursued a variety of engineering-related experiences to inform their development and decision-making. They identified critical undergraduate experiences to include internships, co-ops, research, student organization participation and leadership experiences. Participants appreciated the direct exposure to engineering work that they received through internships and co-ops. In addition, student organizations provided salient on-campus experiences and support networks that influenced their development and persistence. These findings illustrate the interconnected nature of students' experiences and the variety of opportunities students utilize for professional development and career decision making.

Conclusion

This review has examined the various ways that experiential learning through student organization has been conceptualized in the literature, illustrating areas where more nuanced investigation of students' involvement could deepen understanding of the impact of these experiences. The challenge of measuring aspects of students' involvement is the limited understanding of the extent and mechanism of their influence. Previous research suggests several promising mechanisms of influence to investigate further, such as skill development, peer networks, sense of belonging and identity development, and career exposure and reflection. By recognizing the breadth and nuance of students' experiences in student organizations, future research can more holistically investigate connections and mechanisms between different forms of involvement and student development outcomes. These findings demonstrate a growing understanding of the influence of students' out-of-class experiences, as well as the need for continued investigation to understand and positively impact students' undergraduate experiences and professional development. Doing so could help inform student advising and university programming to develop interventions and support students in their professional development and transition into the workforce.

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