2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC

Host Sponsor UNC Charlotte

ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Paper ID #54268

Engineering & Computer Science Residential Learning Community: A cross-collaborativ program that promotes student success

Irene Hillman, University of Tennessee at Chattanooga

Engineering & Computer Science Residential Learning Community: A cross-collaborative program that promotes student success

Abstract

Residential Learning Communities (RLCs) exist to enhance students' educational experiences, both academically and socially. These communities bring together groups of students with shared common goals, interests, or programs and create supportive environments for collaboration and engagement. Through RLCs, students develop relationships with each other and with university faculty and staff outside of the classroom environment.

In 2019, a public university in the southeastern region of the United States established an RLC to specifically serve the student population of the College of Engineering and Computer Science (CECS). The program integrates four key components: (1) a shared first year one-hour weekly seminar for incoming first-year students that pairs with an academic course, (2) a faculty-in-residence who resides among the students, (3) a roommate roster focused on establishing four-person suites of the same or similar major, and (4) monthly social activities that engage participants with the local community and region. The CECS RLC was established in collaboration between the student support division of the CECS and the university housing department. The goal of the CECS RLC is to create a community among participating students, aid in improving first to second year retention, and aid in improving academic performance for participating students, with specific attention to incoming first-year students.

In the following six years, the program grew from 32 student residents to 106 student residents. Although the increase in the number of residents indicates the RLC is popular with students, it was unclear if the RLC is meeting its initial goals for program participation.

This study addresses whether the CECS RLC program is successful by evaluating three areas regarding first-year student participants: (1) sense of belonging and community, (2) academic performance, and (3) retention rate into second year of attendance. The study used extant quantitative data to determine academic performance and retention rates and extant qualitative data to determine students' sense of belonging. Results indicate that CECS RLC participation by first-year students in the 2024 cohort was meaningfully associated with academic performance as demonstrated by GPA, and retention at the college into the second year of attendance in comparison to CECS first-year students who do not participate in the CECS RLC. Additionally, the most common theme derived from qualitative data indicate that CECS RLC students describe increased social integration and a sense of belonging because of program participation. This study's results confirm that university RLCs, if strategically programmed, can be a high impact practice. The results also imply that RLC programs in rigorous academic areas, such as engineering and computer science, where strong sense of belonging, high academic performance, and high retention could be more difficult to achieve, can be effective. The study itself implies that evaluation of such programs does not require excessive resources or time, which can encourage other program managers to evaluate their RLCs for effectiveness.

Introduction

Organizational cultures where people trust each other and feel psychologically safe to practice intellectual curiosity and pursue collaborations set the stage for innovative work to emerge [1]. This means ensuring diverse voices and viewpoints are welcomed, and obstacles of innovation, such as bureaucratic processes or political thinking, are removed [1], [2], [3]. One such instance where innovation has been applied in a higher education setting is the development and implementation of Residential Learning Communities (RLCs), which generally require cross-campus collaboration within multiple departments to create, operate, and maintain these programs over time.

The concept of the RLC is not new. The first use of a living and learning community in the United States has been attributed to the University of Wisconsin through The Experimental College in 1927 [4]. While there are now many colleges that host RLCs [5], it requires continued innovation for university representatives to leverage new developments at their individual institutions to strengthen and grow RLC programs.

According to Barefoot [6], most colleges and universities have some form of transitional support program in place for first-year students, but the author indicates only a small fraction are effectively assessed. There is a need for ongoing research regarding the usefulness of these programs. Colleges and universities cannot afford to spend time and money on programs that are not producing improvements in student support, academic performance, or persistence.

In 2019, a public university in the southeastern region of the United States established an RLC to enhance students' educational experiences, both academically and socially. The RLC under examination was developed to specifically serve the student population of the College of Engineering and Computer Science (CECS). Clearly defining the mission and goals of an RLC is a crucial first step in creating and implementing such a program [7]. The goals of the CECS RLC are (1) to create a community among participating students, (2) aid in improving first to second year retention, and (3) aid in improving academic performance for participating students, with specific attention to incoming first-year students where the transition to college can create challenges for incoming community members.

In the years since its inception, the CECS RLC has undergone a series of iterations where innovative practices were consistently called upon to improve upon and grow the program. Though not all of the following aspects were part of the original format, the program currently integrates four key components: (1) a shared first year one-hour weekly seminar for incoming first-year students that, since 2024, pairs with an academic course, (2) a faculty-in-residence who resides among the students, (3) a roommate roster focused on establishing four-person suites of the same major, and (4) monthly social activities that engage participants with the local community and region.

Within a six-year period, the CECS RLC program grew from 32 student residents to 106 student residents. Although the increase in the number of residents indicates the RLC is popular with students, it was unclear if the RLC is meeting its initial goals. This paper uses extant data to determine:

- RQ1. What are the perceived benefits of RLC participation among currently enrolled students, and does a sense of belonging rank among them?
- RQ2. How does RLC participation correspond with first to second year persistence for participants?
- RQ3. How does RLC participation correspond with academic performance for participating first-year students?

Literature Review

RLCs in Engineering Education

RLCs, also referred to as Living-Learning Communities (LLCs) in the literature, are structured programs that intentionally integrate students' academic experiences with their residential environments. These communities typically cluster students by academic interest, incorporate linked coursework or seminars, and provide access to faculty and staff within the residential setting [7]. Within engineering education, LLCs have been increasingly adopted as a strategy to address persistent challenges related to first-year transition, academic rigor, and student retention.

Research within engineering education indicates that the first year is a critical period for persistence, as students encounter demanding curricula, competitive grading structures, and shifts in academic identity [8]. These challenges disproportionately affect engineering and computer science students, for whom early academic difficulty and limited social integration are common predictors of attrition [9]. RLCs are often positioned as high-impact practices capable of supporting student success by simultaneously addressing academic and social dimensions of learning [10].

Sense of Belonging in Science, Technology, Engineering and Math Contexts

A large body of engineering education research identifies sense of belonging as a key factor influencing persistence and engagement among students in science, technology, engineering, or mathematics (STEM) fields [9], [11]. Sense of belonging refers to students' perceptions of acceptance, inclusion, and mattering within a defined community [12]. In engineering and computer science programs, where coursework is often competitive and time-intensive, students may experience isolation that undermines resilience and persistence.

RLCs are designed to mitigate these risks by fostering structured peer interaction, shared academic experiences, and sustained engagement beyond the classroom. Previous research has shown that students in learning communities report higher levels of social integration, stronger peer networks, and more frequent interaction with faculty compared to non-participants [7]. These outcomes align with the theory of student departure put forward by Tinto [8], which emphasizes the importance of both social and academic integration in promoting retention. Within STEM-specific RLCs, co-locating students by academic area and linking residential experiences to academic programming may further strengthen belonging by normalizing collaboration and reinforcing disciplinary identity. However, while belonging has been widely studied in STEM contexts, fewer studies explicitly examine how residential programs contribute to belonging among engineering and computer science students, particularly using qualitative student perspectives.

Academic Performance and Collaborative Learning

Academic performance is a primary outcome of interest in STEM education research, particularly in the context of high-impact practices such as RLCs. The theory of student involvement suggests that learning and academic achievement are positively related to the quantity and quality of students' involvement in educationally purposeful activities [10]. RLCs promote such involvement by facilitating peer collaboration and providing access to academic support, such as a faculty-in-residence, within the dormitory environment.

Prior research has indicated that STEM students participating in RLCs demonstrate higher GPAs and improved course performance relative to their peers [5]. These academic benefits are often attributed to informal peer tutoring, shared studying, and exposure to academic norms within a supportive community. From a social learning perspective, learning occurs through interaction and shared practice, positioning RLCs as communities of practice that support disciplinary learning [13].

Despite generally positive findings, the magnitude of academic gains associated with RLC participation varies across institutions and cohorts [7]. This variability highlights the importance of program design, implementation, and alignment with disciplinary needs, factors that are especially critical in rigorous engineering and computer science programs.

Retention and Persistence in Engineering Programs

Retention remains a persistent concern in engineering education, particularly between the first and second years of enrollment. Nationally, engineering programs experience significant attrition during the first year, often linked to academic difficulty, lack of connection, and unclear professional identity [8]. As a result, many engineering colleges have implemented learning communities as a retention-focused intervention. Evidence suggests that participation in engineering-focused RLCs is associated with higher first-year retention rates, though results are not universally statistically significant [5]. Inkelas et. al. [7] noted that learning communities tend to produce modest but meaningful gains in persistence, particularly when programs are intentionally designed and adequately supported.

Much of the existing literature relies on single-cohort analyses or resource-intensive data collection methods. There is a relative lack of studies demonstrating how engineering RLCs can be evaluated using extant institutional data across multiple cohorts—an approach that aligns with the practical constraints faced by many engineering education administrators.

Need for Program Evaluation and Contribution of the Present Study

Although RLCs are widely implemented, it is argued that many first-year support programs lack systematic evaluation, limiting the ability of higher education leaders to determine effectiveness or justify continued investment [6]. This concern remains relevant in STEM education, where resource constraints necessitate evidence-based decision-making.

The present study contributes to the engineering education literature by evaluating a STEM related RLC using a mixed descriptive approach grounded in extant qualitative and quantitative data. By examining sense of belonging, academic performance, and first-to-second-year retention across multiple cohorts, this study addresses gaps related to discipline-specific RLC assessment and feasible evaluation practices.

Furthermore, this research extends existing literature by demonstrating that strategically designed RLCs can support student success in rigorous engineering and computer science programs. The findings provide empirical support for cross-divisional collaboration among engineering faculty, student success staff, and housing professionals as an effective model for enhancing first-year engineering education outcomes.

Methodology

Research Design

This study employed a secondary data analysis design using extant data collected by the university for administrative and assessment purposes. The data were originally gathered for purposes other than the present study but were appropriate for addressing the current research questions.

For RQ1, qualitative methods were used and responses from CECS RLC members to an open-ended question were evaluated to identify themes. An inductive qualitative approach was used to analyze open-ended question responses. The researcher familiarized themself with the data by reading and re-reading the texts to gain an overall understanding of the content. Data were coded without predefined categories, allowing themes to emerge directly from participants' narratives. Through iterative coding and thematic analysis, patterns were identified that reflect shared experiences and perceptions among respondents. Representative quotations were selected to illustrate each theme and to ensure that participants' perspectives are accurately represented. The findings were interpreted in relation to the research question and the study's literature review.

For RQ2 and RQ3, academic performance and one-year retention outcomes were examined for first-year CECS students in the Fall 2023 and Fall 2024 cohorts. Outcomes included term grade point average (GPA), median term GPA, one-year retention within the CECS, and one-year retention at the university. Data were reported from the university's institutional research office in descriptive form. Data were separated by cohort and by participation in the CECS RLC program as illustrated by tables 1 and 2 below.

Table 1: Fall 2024 CECS RLC Cohort Descriptive Statistics of GPA and First-Year Retention

Fall 2024 Cohort	**N**	**Mean Term GPA**	**Median Term GPA**	**One-Year Retention in CECS**
All First-Year Students (first-time freshman only) – with and without RLC Engineering participation	337	2.71	3.0	68.5%
All First-Year Students (first-time freshman only) – with RLC Engineering participation	37	3.02	3.29	83.8%
All First-Year Students (first-time freshman only) – without RLC Engineering participation	300	2.67	2.93	66.7%

Table 2: Fall 2023 CECS RLC Cohort Descriptive Statistics of GPA and First-Year Retention

Fall 2023 Cohort	**N**	**Mean Term GPA**	**Median Term GPA**	**One-Year Retention in CECS**
All First-Year Students (first-time freshman only) – with and without RLC Engineering participation	329	2.43	2.81	59.1%
All First-Year Students (first-time freshman only) – with RLC Engineering participation	46	2.47	2.97	63.0%
All First-Year Students (first-time freshman only) – without RLC Engineering participation	283	2.42	2.8	58.5%

Data Sources and Collection Procedures

The extant data consisted of two primary sources: (1) institutional student records maintained by the university and (2) written student feedback obtained through an open-ended survey item maintained by the CECS.

For RQ1, the survey data included narrative responses provided by students to a single survey question, namely: *Why or how has the CECS RLC been a benefit to you as a student? Please be as specific as possible.* This question is included in a survey which is part of a routine feedback process regarding RLC participation conducted by the CECS. The student records and survey responses were collected prior to the initiation of this study through standard procedures. The survey was conducted through Qualtrics, a survey software platform.

For RQ2, records for students from two first-year CECS cohorts - (1) RLC participants and (2) not RLC participants - were examined to review student persistence from first to second year within the CECS to gauge retention for each cohort. A request was sent from the researcher to their university's institutional research office to secure these descriptive data.

For RQ3, records for students from two first-year CECS cohorts – (1) RLC participants and (2) not RLC participants - were examined to explore mean and median grade point averages (GPA) for each cohort to gauge academic performance. A request was sent from the researcher to their university's institutional research office to secure these descriptive data.

No additional data were collected for the purposes of this research. The researcher obtained access to the extant data through institutional approval processes. Both quantitative and qualitative data were provided in de-identified format to protect student privacy.

Data Preparation

For RQ1, student survey responses were compiled and organized for inductive coding. In this way, themes emerged organically. Survey responses that did not include open-ended responses were not included in analysis.

For RQ2 and RQ3, prior to analysis, the datasets involving student records were reviewed for completeness, accuracy, and relevance to the study by the university's office of institutional research. Records with missing or incomplete data on key variables were excluded from the analysis.

Ethical Considerations

Because this study relied exclusively on extant, de-identified institutional data, it did not involve direct interaction with human participants. Consistent with ethical standards and institutional review board (IRB) guidelines, the study qualified for exempt status or non–human subjects research determination. All data were handled in accordance with university data governance and confidentiality requirements.

Limitations of the Data

Use of extant institutional data limited the study to variables and responses as originally collected and precluded control over data collection procedures. These limitations were considered when interpreting the findings.

For RQ1, survey responses with a response to the single open-ended survey item were limited to fourteen responses from current CECS RLC participants in the Fall 2025 cohort. This smaller sample size may skew results.

For RQ3, it was not possible to determine statistical significance for the mean or median GPA because standard deviation, standard error, and raw GPA data were not obtained.

Results

RQ1

For RQ1, the researcher sought to determine the primary benefits of the CECS RLC on participants to understand if an increased sense of belonging, a goal of the program, was being attained. An inductive coding analysis of the survey question responses revealed six themes derived directly from repeated ideas, language, and meanings expressed by participants rather than from a pre-existing framework. Each theme is described below along with salient quotes drawn directly from the data to illustrate each theme.

1. *Sense of Community and Belonging*

   Students frequently described the RLC as providing an immediate and meaningful community, especially during the transition to campus life, as well as friendships and social connections. Examples from the responses include:

   - *There has been a wonderful group of people that I have met that already gave me a community once I arrived on campus.*
   - [The RLC has been a benefit to me*] by placing me with roommates with a like-mind to mine since this is not my hometown.*
   - *Being a part of the RLC meant that I had someone I could study with at the dorm who was a part of my classes.*
   - *It has allowed me to meet others who are fun to be with and are also in fields similar to mine.*

- *I have met countless friends and acquaintances through the RLC, some of my closest friends being my roommates.*
- *This helped me meet friends while also learning to be more confident in myself.*
- *All the trips that* [the program manager] *plans are so fun and helps me bond with people while relaxing.*

2. *Academic Support and Peer Learning*

   Students emphasized how peer interactions within the RLC supported academic success through shared learning and advice. Examples from the responses include:

   - *Being a part of the RLC meant that I had someone I could study with at the dorm who was a part of my classes.*
   - [I received from other RLC members] *great advice for what professor to take for each class.*
   - [Other RLC members provided*] help with a difficult class.*
   - *I frequently get together with other RLC members to work on our schoolwork and tutor each other.*

3. *Career Identity and Preparation*

   The RLC reinforced students' academic and professional identities. Examples from the responses include:

   - [through the RLC, I was able to] *learn more about what I should expect as an engineering student.*
   - *Just to have an open resource to go to for any and all questions pertaining to my career field is something that not a lot of other students may have.*
   - *This helped me learn how to be more professional and how to network.*

4. *Personal Growth*

   Participation in the RLC contributed to increased confidence both socially and academically. Examples from the responses include:

   - [The RLC] *helped me with my social skills in meeting new people.*
   - *Through the RLC I've made lifelong friendships and gained confidence in all of my studies.*
   - [A benefit of RLC participation for me was] *learning to be more confident in myself.*
   - [The RLC class taught me to] *balance in my planner to where I'm not studying for 6–8 hours a day.*

5. *Well-being and Engagement through RLC Excursions*

   Students described the RLC as helping them manage the demands of rigorous coursework by offering balance and stress relief through organized events and shared experiences.

   - *It definitely provided some escape.*

- *Going out and spending time with my friends in the RLC actually tend to promote my good study habits and improve my grades.*
- [The RLC benefited me*] through the events, I have got to experience Chattanooga.*
- *All the trips that [the program manager] plans are so fun and helps me bond with people while relaxing.*
- [The RLC benefited me by allowing me to*] have new experiences and actually enjoy the new city that I live in.*

Overall, results suggest that participation in RLC Engineering is associated with an increased sense of community and belonging, academic support and peer learning, career identity and preparation, personal growth, and well-being and engagement through program excursions.

RQ2

For RQ2, the researcher sought to understand how RLC participation corresponded with first to second year persistence at the CECS. Across both Fall 2023 and Fall 2024 cohorts, descriptive differences were observed between first-time freshmen who participated in RLC Engineering and those who did not, respective to first year college retention.

One-year retention in the CECS was compared between first-time, first-year students who participated in the RLC Engineering program and those who did not, using two-proportion *z*-tests. Analyses were conducted separately for the Fall 2023 and Fall 2024 cohorts.

For the Fall 2024 cohort, students who participated in RLC Engineering demonstrated a significantly higher one-year retention rate (83.8%, $n = 37$) compared to non-RLC students (66.7%, $n = 300$). This difference was statistically significant, $z = 2.12$, $p = .017$ (one-tailed), indicating that RLC participation was associated with improved retention outcomes for this cohort.

For the Fall 2023 cohort, RLC Engineering participants also exhibited a higher one-year retention rate (63.0%, $n = 46$) than their non-RLC peers (58.5%, $n = 283$); however, this difference was not statistically significant, $z = 0.56$, $p = .287$ (one-tailed).

Overall, results suggest that participation in RLC Engineering is associated with higher first-year retention, with statistically significant effects observed for the Fall 2024 cohort but not for the Fall 2023 cohort.

RQ3

For RQ3, the researcher sought to understand how RLC participation corresponded with academic performance for participating first-year students. Across both Fall 2023 and Fall 2024 cohorts, descriptive differences were observed between first-time freshmen who participated in RLC Engineering and those who did not respective to term GPA.

The 2024 RLC group's mean GPA is 0.35 points higher than non-participants, which is a moderate-to-large practical difference in GPA terms. These are substantively meaningful differences, but statistical significance depends on variability. With N = 37 vs. N = 300, significance is plausible if GPA variability is typical (≈0.6–0.8), but this cannot be asserted or tested without variance data. Additionally, the median GPA for 2024 RLC participants is 0.36

points higher, again indicating the difference is not driven solely by outliers. This suggests a distribution-wide shift upward, not just a mean effect. Both mean and median GPAs are substantially higher for 2024 students with RLC Engineering participation. The consistency between mean and median differences strengthens the descriptive evidence of an academic benefit.

The 2023 RLC group's mean GPA is 0.05 points higher than non-participants in this cohort, which is a small practical difference in GPA terms. The median GPA for 2024 RLC participants is 0.17 points higher, indicating a small-to-moderate difference. Both mean and median GPAs are higher for 2023 students with RLC Engineering participation, but the difference was less substantial in comparison to results of the 2024 cohort.

Overall, results suggest that participation in RLC Engineering is associated with increased academic performance, with more observable effects observed for the Fall 2024 cohort than for the Fall 2023 cohort. A single structural change impacted the 2024 cohort which could account, at least in part, for this difference. The university adopted a Quality Enhancement Plan (QEP) that included two changes. First, the QEP adopted the pairing of two courses for incoming freshmen, the shared first year one-hour weekly seminar for the RLC and an academic course. It is possible students in the 2024 cohort benefitted from a shared second course, resulting in higher levels of social learning. Second, the QEP increased the budget for the first year one-hour weekly seminar, providing approximately $2,000 USD more than previous years. This allowed for higher quality options for monthly excursions. It is possible these above average excursions prompting greater involvement from students, resulting in higher levels of social integration.

Discussion

This study examined the influence of participation in the CECS Residential Learning Community (RLC) on first-year engineering students' sense of belonging, academic and professional development, retention, and academic performance. Guided by theories of student integration and belonging, the findings suggest that the RLC functions as a multifaceted intervention that supports both psychosocial and academic dimensions of student success, with particularly strong effects observed for the Fall 2024 cohort.

Sense of Belonging and Student Integration

Findings related to RQ1 indicate that the CECS RLC fosters a strong sense of community and belonging among participants. Students described the RLC as providing immediate social connections, shared academic experiences, and emotional support during the transition to college. These findings align closely with the theory of student departure developed by Tinto [8] which emphasizes the importance of both social and academic integration in promoting persistence. By co-locating students with shared academic interests and facilitating structured interactions, the RLC appears to create conditions that promote integration into the academic and social fabric of the university.

Additionally, students' emphasis on feeling welcomed, supported, and connected reflects key components of belongingness theory, which posits that students' perceptions of mattering and acceptance are central to resilience and persistence [12]. Prior research has shown that sense of belonging is particularly salient for students in STEM disciplines, where competitive climates and high academic demands can undermine persistence [9]. The qualitative findings suggest that

the RLC mitigates these challenges by fostering peer relationships and normalizing collaborative learning.

Academic Support, Identity, and Professional Socialization

Beyond social belonging, participants highlighted the academic and professional benefits of RLC participation, including peer tutoring, shared studying, and access to advice about coursework and faculty. These findings are consistent with social learning theory, which emphasizes learning as a socially situated process occurring through interaction and shared practice [13]. The RLC environment appears to function as a community of practice in which students collectively navigate the academic norms and expectations of engineering or computer science education.

Students also described gains in career identity and professional confidence, suggesting that the RLC supports early engineering identity formation. Prior research indicates that developing an engineering identity is a critical factor in persistence, particularly during the first year [11]. Exposure to peers with similar career aspirations, structured programming, and accessible faculty may reinforce students' identification with the engineering profession, thereby strengthening commitment to their chosen field.

Retention Outcomes and Theoretical Alignment

Results for RQ2 provide quantitative evidence that complements the qualitative findings. For the Fall 2024 cohort, RLC participants demonstrated significantly higher one-year retention than non-participants, supporting the assertion that increased belonging and integration are linked to persistence [8], [12]. The absence of statistical significance for the Fall 2023 cohort, despite higher retention rates among RLC participants, may reflect limited statistical power, cohort-specific factors, or programmatic evolution.

Importantly, the consistent direction of effects across cohorts aligns with prior research on learning communities, which has found positive but sometimes variable impacts on retention depending on implementation and cohort characteristics [7]. These findings underscore the importance of examining RLC outcomes longitudinally and could suggest that program maturation may enhance effectiveness over time.

Academic Performance and Engagement

Findings related to RQ3 further suggest that RLC participation is associated with improved academic performance, particularly for the Fall 2024 cohort. The observed differences in both mean and median GPA indicate a broad academic benefit rather than effects driven by a small subset of high-achieving students. From a theoretical perspective, these outcomes may be explained by increased academic engagement, peer accountability, and access to informal academic support, mechanisms emphasized in the theory of student involvement put forth by [10].

The smaller GPA differences observed for the Fall 2023 cohort mirror the retention findings and further suggest that programmatic or contextual factors may moderate the impact of RLC participation. Nevertheless, the consistently higher GPAs among RLC participants across cohorts provide descriptive evidence that residential learning communities can support academic achievement in demanding engineering curricula.

Limitations and Implications for Research and Practice

Several limitations warrant consideration. Participation in the RLC was voluntary, introducing the potential for self-selection bias. Additionally, academic performance analyses were limited to descriptive comparisons due to unavailable variance data. Future research should employ multivariate or quasi-experimental designs, control for pre-college academic preparation, and examine longer-term outcomes such as major persistence and graduation.

Another limitation to consider is that the 2023 cohort generally included students who were in high school at the freshmen level during the Coronavirus-19 nationwide quarantine, which may have interrupted their social development. The 2024 cohort generally did not experience the same level of disruption during their high school experience, which may impact differences between the two cohorts.

Despite these limitations, the convergence of qualitative and quantitative findings strengthens confidence in the conclusions. The results suggest that the CECS RLC promotes key theoretical constructions, including belonging, integration, involvement, and identity development, that are known to support persistence and success in higher education. As such, residential learning communities represent a promising strategy for improving student outcomes in engineering and computer science education, particularly during the critical first year.

References

[1] Miller, P., & Wedell-Wedellsborg, T., *Innovation as usual: How to help your people bring great ideas to life*. Brighton, MA: Harvard Business Review Press, 2013.

[2] Morris, L., *Permanent innovation*: Innovation Academy, 2011.

[3] Northouse, P. G., *Leadership: Theory and Practice*. Thousand Oaks, CA: Sage Publications, 2018.

[4] Meiklejohn, A., "Wisconsin's experimental college", *The Journal of Higher Education, 1*(9), 485-490, 1930.

[5] Palm, W. J., & Thomas, C. R., "Living–Learning Communities Improve First-year Engineering Student Academic Performance and Retention at a Small Private University," *2015 ASEE Annual Conference & Exposition*, Seattle, Washington, 2015.

[6] Barefoot, B. O., "The first-year experience: Are we making it any better?" *About campus, 4*(6), 12-18, 2000.

[7] Inkelas, K. K., Jessup-Anger, J. E., Benjamin, M., & Wawrzynski, M. R., *Living-learning communities that work: A research-based model for design, delivery, and assessment*: Taylor & Francis, 2023.

[8] Tinto, V., *Leaving College: Rethinking the causes and cures of student attrition*: University of Chicago press, 2012.

[9] Wilson, D., Jones, D., Bocell, F., Crawford, J., Kim, M. J., Veilleux, N., Plett, M., "Belonging and academic engagement among undergraduate STEM students: A multi-institutional study," *Research in Higher Education, 56*(7), 750-776, 2015.

[10] Astin, A. W., "Student involvement: A developmental theory for higher education," *College student development and academic life* (pp. 251-262): Routledge, 2014.

[11] Godwin, A., Potvin, G., Hazari, Z., & Lock, R., "Identity, critical agency, and engineering: An affective model for predicting engineering as a career choice," *Journal of engineering Education, 105*(2), 312-340, 2016.

[12] Strayhorn, T. L., "Exploring the impact of Facebook and Myspace use on first-year students' sense of belonging and persistence decisions," *Journal of College Student Development, 53*(6), 783-796, 2012.

[13] Merriam, S. B., & Bierema, L. L., *Adult learning : linking theory and practice* (First edition. ed.). San Francisco: Jossey-Bass, 2014.