Linguistic and Philosophical Investigations
ISSN: 1841-2394, e-ISSN: 2471-0881
Vol 23 (1s), 2024
pp.341-358

Contextual and Organizational Factors that Mediate the Influence of Leadership Roles on Academic Retention.

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Abstract.

The research presents a systematic review on leadership practices associated with academic retention in university students between 2010 and 2024, using Rayyan and VOSviewer for the analysis of bibliometric data and the identification of trends in the selected publications. The main objective is to identify and analyze leadership strategies that have been shown to be effective in improving student retention in higher education institutions. The methodology uses the PRISMA protocol, evaluating quantitative and qualitative studies from international databases. The results indicate that transformational leadership practices, mentoring programs, and personalized guidance contribute significantly to university permanence. In conclusion, the study underscores the importance of educational leadership in student retention, suggesting that a combination of inclusive and adaptive practices may be essential to reduce college dropout. The findings have practical implications for education policymakers and institutional leaders.

Keywords : Educational Leadership, Academic Retention, College Dropout, Systematic Review

Data of Publication: 12 December 2024

Introduction

The study of retention factors in higher education programs has gained relevance, due to their impact on educational quality and the efficiency of education systems (UNESCO, 2019). The university has adapted teaching, research, and cultural dissemination practices in order to foster an educational experience that promotes student success and, in this way, increase retention rates (González-Nieto & Rodríguez-Hernández, 2023).

In the United States, a report by the *National Center for Education Statistics* (NCES) revealed that the retention rate of first-year students in higher education institutions was 81% in 2019 (Irwin et al., 2023). This percentage varies significantly between public and private institutions, with a retention rate of 85% in private universities compared to 78% in public universities (Irwin et al., 2023). In Europe, the situation is different. The retention rate in higher education programmes in the European Union varies considerably between countries. For example, in Germany, the retention rate in 2018 was 82%, while in Italy it was 70%. A study conducted by the European Commission in 2020 highlighted that academic factors, such as teaching quality and academic support, are key determinants in student retention in the region (European Commission, 2020).

Retention Factors in Higher Education Programs in Spain

Student retention in higher education programs in Spain is a topic of growing interest for both educational institutions and public policymakers (Mellizo-Soto, 2022). The ability of universities to keep their students until the completion of their studies and statistical data provide a clear view of the current situation. In the 2020-2021 academic year, the dropout rate in Spanish universities was around 21%, according to data from the Ministry of Universities (SPADIES, 2020). This percentage varies significantly between different areas of study. For example, social and legal sciences have an 18% dropout rate, while in engineering and architecture this figure rises to 28% (Ministry of Universities, 2021).

The retention rate also shows notable differences depending on the study modality. In-person programs have a retention rate of 79%, compared to 65% for distance programs. This difference can be attributed to the greater interaction and support that students receive in a face-to-face setting (Fundación CYD, 2021). Academic performance is another crucial factor. Students who earn higher grades in their first year have a higher chance of continuing their studies. Specifically, 85% of students who pass all subjects in their first year continue in the second, while this figure drops to 60% for those who do not pass more than half of the subjects (Fundación CYD, 2021). The economic situation of the students also plays an important role. According to a study by the CYD Foundation, 30% of students who drop out of school do so for economic reasons. Scholarships and study grants are, therefore, a determining factor in retention. In the 2019-2020 academic year, 25% of university students in Spain received some type of scholarship or grant, which contributed to reducing the dropout rate (Lorenzo-Quiles et al., 2023). The family and social environment is another relevant aspect. Students who have the support of their family and friends are more likely to continue their studies (Calduch et al., 2020). A report by the Student Observatory reveals that 70% of students who receive emotional and academic support from their immediate environment continue their studies, compared to 50% of those who do not have such support (Álvarez, 2021).

Satisfaction with the institution and the program of study significantly influences student retention. According to a survey conducted by the Ministry of Universities, 80% of students satisfied with their university and study program continue until they are completed, in contrast to only 50% of dissatisfied students (SPADIES, 2020).

Several factors contribute to this satisfaction and, therefore, to retention:

- **Access to Academic and Personal Support Services**: Colleges that offer tutoring, academic advising, and wellness services report higher retention rates. In the 2020-2021 academic year, those universities that provided these services had a retention rate of 85%, compared to 70% of those that did not (Fundación CYD, 2021).
- **Integration into University Life**: Participation in extracurricular activities, such as sports, clubs, and associations, is also essential. A study by the University of Barcelona found that 75% of students who actively participate in university life continue their studies, compared to 55% of those who do not (Calduch et al., 2020).
- **Employability and Job Outlook**: The perception that the degree program will provide good job opportunities also influences retention. According to data from the National Institute of Statistics, 85% of students who believe that their career will offer them good job opportunities continue their studies, compared to 60% of those who do not (Thies & Falk, 2024).

Methodology

The research has been carried out adhering to the PRISMA method (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*), guaranteeing transparency and meticulousness in our synthesis (Green et al., 2011). In addition, we have incorporated the PICO framework to define the inclusion criteria for studies, as suggested by Page et al. (2021). Our analysis process was carried out with the checklist suggested in the PRISMA 2020 Declaration, reinforcing the possibility of replication of our study.

Bibliometric analysis.

VOSviewer version 1.6.20 has been used for the generation of network data and files, which serve as the basis for performance analysis (Arruda et al., 2020). This analysis allows clarifying the bibliometric profile of publications, identifying the most prominent works, authors, countries, and journals, as well as scientific mapping, which uncovers the predominant themes and underlying trends through the analysis of co-authorships, co-occurrences, and bibliographic couplings (Wong, 2018). The findings of the bibliometric analysis are detailed in the following sections.

Research objectives and questions

The research question guiding this study was formulated following the PICO guidelines of the *National Institute for Health and Care Excellence* (Liberati et al., 2009) and is aligned with the recommendations of the *Cochrane Handbook for Systematic Reviews of Interventions (*Higgins & Thomas, 2019). The question designed to capture the primary objective of the research is: (Q) In college students, (I) how do leadership practices (C) influence academic retention?

Specific

– What is the methodological distribution between 2010 and 2024?
– Which authors and documents have shown the greatest impact of citation between 2010 and 2024?
– What are the thematic focuses of studies on the influence of leadership roles on academic retention between 2010 and 2024?

Systematic Review Methodology

In line with the PRISMA methodology, the study follows a systematic review protocol designed to ensure unbiased and transparent data collection, minimizing the risk of bias and strengthening the evidence base related to the specific field of research. Data collection was carried out through a comprehensive search carried out in July and August 2024, using a renowned academic database, such as *Web of Science* (WoS). Source selection was limited to research articles published in peer-reviewed academic journals and between 2010 and 2024. Book chapters and theses were excluded. The search terms, detailed in Table 1, were chosen following the PICO model, which allowed a focused and pertinent search in relation to the topic.

Table 1. ***Keywords formulated with the PICO strategy.***

PICO Component	**Description**
Patient/Population (P)	Estudiantes universitarios (*"university students"* OR *"college students"* OR *"Higher Education students"*)
Intervention (I)	Leadership
Comparison (C)	A direct comparison is not specified in the search.
Result (O)	Academic retention the Desertion (*"academic retention"* OR *"dropout"*)
Search	
Wos	*"leadership"* (Tema) AND *"dropout"* (Tema) OR *"retention"* (Tema) AND " *university*" OR "*college*" OR " Higher Education" students (Tema)

To ensure the accuracy and relevance of the systematic review, additional parameters were established for the literature search. The studies to be included had to have been published between 2010 and 2024 and were limited exclusively to scientific journal articles. Only those articles that were available in open access and written in English were considered. The research focused on the areas of education and educational research, ensuring that the topics were directly relevant to the field of study. In addition, specific filters were applied to exclude terms such as "*High school*", "*online*" and "*online*" from the title, abstract and keyword fields, with the aim of omitting studies that were not relevant.

Table 2. ***Inclusion and exclusion criteria***

Inclusion and exclusion criteria are essential to guarantee objectivity in research. Following the PICO methodology, detailed in Table 2, this systematic review focuses on original articles that apply qualitative, quantitative, mixed methodologies and systematic reviews.

Criteria	Population	Intervention	Results
Inclusion	Students of universities or institutions of higher education.	Studies that investigate the influence of leadership in educational contexts.	Research that examines academic retention or student attrition, evaluating the effectiveness of leadership and its impact on educational outcomes.
Exclusion	Studies focused on high school students.	Research focused on online or distance learning modalities.	Studies that do not directly link leadership to academic retention, that do not evaluate the effectiveness of leadership in educational contexts, or that have not been published between 2010 and 2024.

Own elaboration.

2.1 Selection process

The flowchart details the study selection process for this systematic review, starting with the initial identification of 142 studies in the *Web of Science* (WoS) database. After eliminating the duplicates (N=2), 140 studies remained, of which 34 were excluded in a first reading of the title because they did not meet the relevance criteria. This left 106 studies for abstract reading, where, following the inclusion and exclusion criteria, an additional 65 studies were eliminated. In this way, 51 studies were left for a complete reading. In this phase, applying the previously defined PICO protocols, another 22 studies were excluded, resulting in a total of 29 studies included in the final analysis.

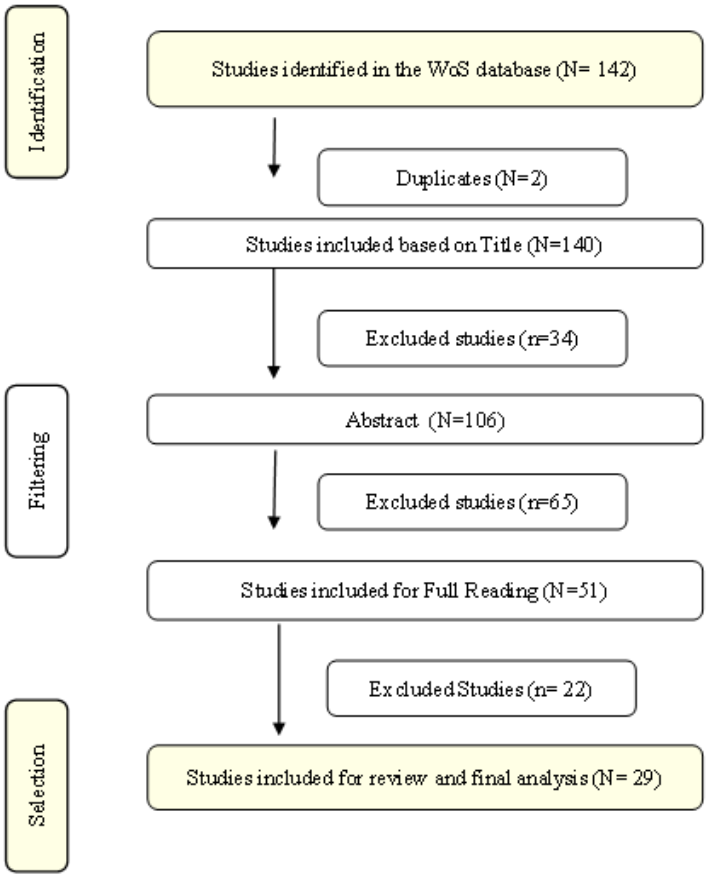


Figure 1. ***Flow chart of the study selection procedure.***

Own elaboration.

The search was conducted in the period from 2010 to 2024. Below is Graph 1 of frequency by year.

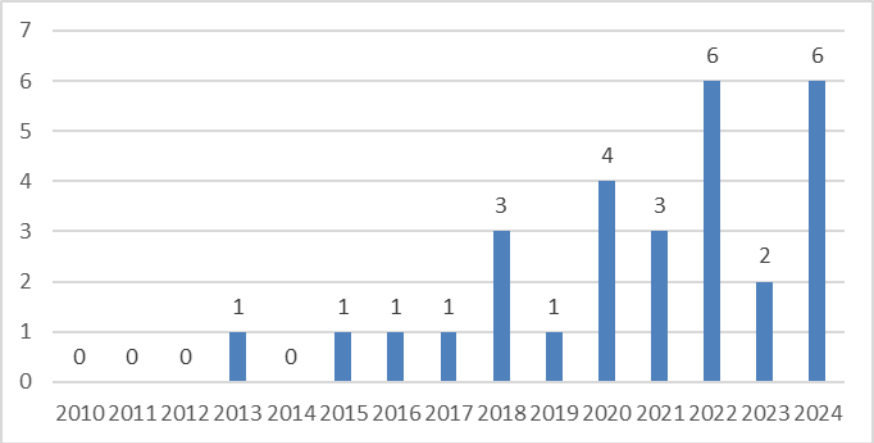


Figure 1. ***Publications per year.***

The analysis of the frequency of publications per year reveals a notable increase in the volume of articles in recent years, with a significant peak in 2022 and 2024. This pattern suggests a growing interest and increased focus on the area of study, possibly driven by an increase in funding or by global events that catalyzed the research. The evolution shows a modest initial activity that intensifies progressively, reaching a culmination in the last period.

Table 3. ***General analysis of the articles***

N°	Authors	Year	Title	Magazine	Nationality
1	Sperling et al.	2024	Effects of a first-year undergraduate engineering design course: survey study of implications for student self-efficacy and professional skills, with focus on gender/sex and race/ethnicity	International Journal of STEM Education	United States
2	Nabi et al.	2024	The Impact of Mentoring in Higher Education on Students' Professional Development: A Systematic Review and Research Agenda	Journal of Higher Education	United States
3	Le et al.	2024	The benefits of peer mentoring in higher education: findings from a systematic review	Journal of Learning Development in Higher Education	United States
4	Rosenberg et al.	2024	Role of mentorship, career conceptualization, and leadership in developing women's physics identity and belonging	Physical Review Physics Education Research	United States
5	Ravishankar et al.	2024	Empowering STEM students: A university-wide mentorship program fostering retention and belonging	Journal of Cellular Physiology	United States
6	Gaftandzhieva et al.	2024	Automated Statistical Analysis for Improving HEIs Training Performance	Proceedings of the Bulgarian Academy of Sciences	Bulgaria
7	Matz et al.	2023	Using machine learning to predict student retention from socio-demographic characteristics and app-based engagement metrics	Scientific Reports	Switzerland
8	Maxwell et al.	2023	PEER-led team learning in an undergraduate biology course: Impacts on	BMC Research Notes	United States

			recruitment, retention, and imposter phenomenon		
9	Chang et al.,	2022	Exploring Structural Relationships in Attracting and Retaining International Students in STEM for Sustainable Development of Higher Education	Sustainability	Taiwan
10	Kim, S. Y.	2022	Student Confidence, Success, and Retention: The Impact of Military Experience on the College Lives of Korean Males	The Qualitative Report	South Korea
11	García-Ojeda & Nishiguchi	2022	The Metamorphosing Professor: Adapting Teaching to Fulfill the Promise of Biology Education	Integrative and Comparative Biology	United States
12	Denaro et al.	2022	Identifying systemic inequity in higher education and opportunities for improvement	PLOS ONE	United States
13	Wu et al.	2022	Female peer mentors early in college have lasting positive impacts on female engineering students that persist beyond graduation	Nature Communications	United States
14	Glinton et al.	2022	An innovative medical school curriculum to enhance exposure to genetics and genomics: Updates and outcomes	Genetics in Medicine	United States
15	Betz et al.	2021	Improving Academic Self-Concept and STEM Identity Through a Research Immersion: Pathways to STEM Summer Program	Frontiers in Education	United States
No.	**Authors**	**Year**	**Title**	**Magazine**	**Nationality**
16	Ayouni et al.,	2021	A new ML-based approach to enhance student engagement in online environment	PLOS ONE	Saudi Arabia
17	Yep et al.	2021	Nuestra Ciencia: Transforming Microbiology for Spanish-Speaking Elementary and College Students	Integrative and Comparative Biology	United States
18	Pritchard, T.J. et al.,	2020	Leadership 2.0: Nursing's Next Generation: Lessons Learned on Increasing Nursing Student Diversity	Online Journal of Issues in Nursing	United States
19	Brigati et al.	2020	How do undergraduates cope with anxiety resulting from active learning practices in introductory biology?	PLOS ONE	United States
20	Vazquez Arreola & Wilson	2020	Bayesian multiple membership multiple classification logistic regression model on student performance with random effects in university instructors and majors	PLOS ONE	United States
21	Cook et al.	2019	Structures last longer than intentions: creation of Ongomiizwin–Indigenous Institute of Health and Healing at the University of Manitoba	International Journal of Circumpolar Health	Canada
22	Cassidy et al.	2018	What does it take to graduate? A qualitative exploration of the perceptions of successful physiotherapy graduates from one university in the UK	Physiotherapy Theory and Practice	England
23	Forrester et al.	2018	Association between Collegiate Recreational Sports Involvement and Undergraduate Student Retention	Recreational Sports Journal	Canada

24	Rodriguez et al.	2018	How do students study in STEM courses? Findings from a light-touch intervention and its relevance for underrepresented students	PLOS ONE	United States
25	Haracki ewicz & Priniski	2018	Improving Student Outcomes in Higher Education: The Science of Targeted Intervention	Annual Review of Psychology	United States
26	Dennehy & Dasgupta	2017	Female peer mentors early in college increase women's positive academic experiences and retention in engineering	Proceedings of The National Academy of Sciences of The United States of America	United States
27	Gentry et al.	2016	The Tie That Binds: Exploring Community College Curriculum Design	PS - Political Science and Politics	United States
28	Forsman et al.	2015	Sandbox University: Estimating Influence of Institutional Action	PLOS ONE	Netherlands
29	Case et al.	2013	Mind the gap: Science and engineering education at the secondary-tertiary interface	South African Journal of Science	South Africa

Own elaboration.

The analysis of the 29 articles reveals that approximately 69% of the publications come from the United States, highlighting its leadership in academic research on education. Other countries represented, such as Canada, Taiwan, South Korea, Switzerland, Bulgaria, England, South Africa or Saudi Arabia, provide limited diversity in comparison. Temporarily, there is a notable increase in recent publications, with 17.2% in 2022 and 10.3% in 2024, reflecting a growing interest in education and student retention issues.

Table 4. Experimental Research Articles.

Experimental research articles use controlled methods to investigate the effects of various interventions. These studies often employ randomized experiments or controlled trials to establish clear causal relationships.

No.	Title	Methodology	Types of experiments
2	The Impact of Mentoring in Higher Education on Students' Professional Development: A Systematic Review and Research Agenda	Experimental	The results showed that new students who participated in the peer mentoring program had significantly higher student performance and the peer mentors themselves increased their academic self-efficacy, improved communication, leadership, and interpersonal presence, and strengthened social and professional networks
4	Role of mentorship, career conceptualization, and leadership in developing women's physics identity and belonging	Experimental	Interventions aimed at increasing dimensions of physical identity (interest, recognition, performance, and competence) can increase persistence overall and increase women's retention in physics studies in a differential way
19	How do undergraduates cope with anxiety resulting from active learning practices in introductory biology?	Experimental	Active learning pedagogies decrease failure rates in "Introduction to Biology" courses, but these practices also cause anxiety in some students
24	How do students study in STEM courses? Findings from a light-touch intervention and its	Experimental	With the emphasis on improving STEM college student outcomes, it is important that we not only focus on modifying

	relevance for underrepresented students		classroom instruction, but also provide students with the tools to maximize their autonomous learning time
25	Improving Student Outcomes in Higher Education: The Science of Targeted Intervention	Experimental	Well-designed interventions consistent with sociopsychological and motivational theories have proven to be remarkably effective because they target specific educational problems and underlying processes. Three types of interventions are evaluated, which focus on the value that students perceive in academic tasks, their framing of academic challenges and their personal values, respectively
29	Mind the gap: Science and engineering education at the secondary-tertiary interface	Experimental	This study summarizes existing interventions aimed at bridging the "gap" between secondary and university education, and describes key innovations in overall programs that are possible at the level of pedagogy, curriculum, and institutional setting
6	Automated Statistical Analysis for Improving HEIs Training Performance	Experimental	A software developed for deans and rectors of Bulgarian higher education institutions (HEIs) is presented, which analyzes data and generates aggregated reports that allow tracking the number of students at different levels (study program, faculty, professional field) and monitors indicators related to the fulfillment of institutional training.
26	Female peer mentors early in college increase women's positive academic experiences and retention in engineering	Experimental	Peer-to-peer mentoring of the same gender for a short period of time promotes the success and retention of women in engineering. The benefits of peer mentoring lasted long after the intervention ended, immunizing women from burnout during the first two years in STEM careers.
13	Female peer mentors early in college have lasting positive impacts on female engineering students that persist beyond graduation	Experimental	A longitudinal study is presented in which it is reflected that a brief and low-cost intervention of peer tutoring demonstrates benefits in promoting the success of female students in engineering from university entrance to the graduate year.
17	Nuestra Ciencia: Transforming Microbiology for Spanish-Speaking Elementary and College Students	Experimental	It describes the "Our Science" program that had a positive impact on science performance in both primary and university education, preparing them to think like scientists and strengthen ties with families.

Table 5. ***Quantitative Research Articles.***

Quantitative studies collect numerical data and use statistical analysis to identify patterns and relationships. These articles provide valuable information on trends and effects on a specific population.

No.	Title	Methodology	Quantitative final results
1	Effects of a first-year undergraduate engineering	Quantitative	Results also reveal differences for specific racial/ethnic and gender/sex subgroups in

	design course: survey study of implications for student self-efficacy and professional skills, with focus on gender/sex and race/ethnicity		numerous constructs, including suggestion of specific effect for female students.
9	Exploring Structural Relationships in Attracting and Retaining International Students in STEM for Sustainable Development of Higher Education	Quantitative	The results suggest that institutional mediation could be an influential factor leading to the satisfaction and retention of international STEM students.
15	Improving Academic Self-Concept and STEM Identity Through a Research Immersion: Pathways to STEM Summer Program	Quantitative	Survey results showed that the program was successful at improving STEM identity and academic self-concepts. Qualitative feedback suggested that the two parts of the program worked together to increase interest and self confidence in STEM majors but also ensured that students connect with other students and felt comfortable in the transition to a 4-year institution.
5	Empowering STEM students: A university-wide mentorship program fostering retention and belonging	Quantitative	Mentorship and research experience enhance students' sense of belonging, science identity, and science efficacy, which are key predictors of retention and persistence in pursuing a STEM career.
20	Bayesian multiple membership multiple classification logistic regression model on student performance with random effects in university instructors and majors	Quantitative	Bayesian multi-membered logistic regression multiple classification (MMMC) models identified that faculty and majors are responsible for a significant proportion of students' academic success and serve as key indicators of retention and graduation rates.

Table 6. ***Qualitative Research Articles***

Qualitative studies focus on the descriptive and exploratory analysis of experiences and perceptions. They use methods such as interviews and case studies to gain a deeper understanding of complex educational phenomena.

N°	**Title**	**Methodology**	**Qualitative final results**
10	Student Confidence, Success, and Retention: The Impact of Military Experience on the College Lives of Korean Males	Qualitative	During their term of military service, they have experienced goal commitment, leadership, and diverse relationships. Upon returning to school, they exhibited a developed set of strengths including a sense of confidence, perseverance, and courage. This attributes significantly contributed to their academic motivation and potentially to their success on campus.
22	What does it take to graduate? A qualitative exploration of the perceptions of successful physiotherapy graduates from one university in the UK	Qualitative	These successful students' sense of belonging, and their alignment with the norms and values of the program, may have been critical to accessing and using these formal and informal resources.

Table 7. ***Review Articles***

Review articles synthesize existing literature to identify trends and gaps in research. These studies offer a critical and panoramic perspective of the accumulated knowledge in an area of study.

N°	Title	Methodology	Panoramic perspective
14	An innovative medical school curriculum to enhance exposure to genetics and genomics: Updates and outcomes	Revision	An innovative parallel curriculum at Baylor College of Medicine serves as a mechanism for garnering increased interest and competence in medical genetics.

Table 8. ***Longitudinal Research Articles.***

Longitudinal studies follow the same individuals or groups over time to analyze changes and developments. This approach is ideal for understanding evolutionary dynamics in educational contexts.

N°	Title	Methodology	Longitudinal study
7	Using machine learning to predict student retention from socio-demographic characteristics and app-based engagement metrics	Longitudinal	Although engagement data were captured as a longitudinal time series with time-marked events, we reduced them to a single set of cross-sectional characteristics for each learner.

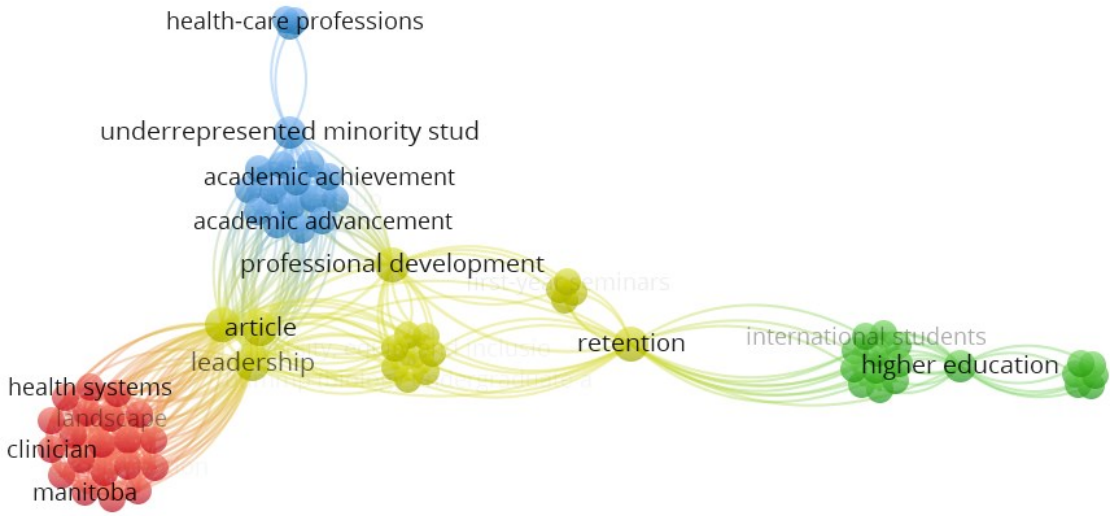
Table 9. ***Articles on Other Types of Methodology.***

Articles classified as 'Other' include innovative or interdisciplinary approaches that do not fit into traditional categories. This type of research promotes the exploration of new areas and the development of emerging methods.

N°	Title	Methodology	Description of the methodology
18	Leadership 2.0: Nursing's Next Generation: Lessons Learned on Increasing Nursing Student Diversity	Other	A multifaceted program is developed that supports underrepresented racial/ethnic minorities and disadvantaged students in the nursing curriculum.
3	The benefits of peer mentoring in higher education: findings from a systematic review	Other	The Urban Universities for HEALTH learning collaborative site team at the University of Cincinnati held focus groups seeking to understand the contributing factors of underrepresented minority students' decision to study within the Academic Health Center colleges of Allied Health Sciences, Medicine, Nursing, and Pharmacy
27	The Tie That Binds: Exploring Community College Curriculum Design	Other	The differences and similarities between different community college curricula from a random sample of fifty schools are examined.
21	Structures last longer than intentions: creation of Ongomiizwin–Indigenous Institute of Health and Healing at the University of Manitoba	Other	A review of internal Human Resources data at Ongomiizwin–Indigenous Institute of Health and Healing at the University of Manitoba

23	Association between Collegiate Recreational Sports Involvement and Undergraduate Student Retention	Other	University database and employment records were analyzed to examine the association between collegiate recreational sports (CRS) involvement and undergraduate retention rates after 1, 2, and 3 years of study at a Canadian university
11	The Metamorphosing Professor: Adapting Teaching to Fulfill the Promise of Biology Education	Other	Design of a portfolio to improve learning outcomes and obstacles for PEER (People Excluded due to their Ethnicity or Race) in STEM.
12	Identifying systemic inequity in higher education and opportunities for improvement	Other	Analysis of racial opportunity gaps between PEERs (People Excluded due to their Ethnicity or Race) and non-PEERs based on institutional data
16	A new ML-based approach to enhance student engagement in online environment	Other	An intelligent system predicts the student's level of engagement and then provides feedback to improve their motivation and dedication.
28	Sandbox University: Estimating Influence of Institutional Action	Other	Multilayer Minimum Spanning Tree and Monte-Carlo methods are used to identifying complex interactions in educational systems and for investigating how manipulation of these systems may affect educational outcomes of interest.
8	PEER-led team learning in an undergraduate biology course: Impacts on recruitment, retention, and imposter phenomenon	Other	The data presented were collected during a multi-year project conducted in the context of large-enrollment introductory biology course at a large private R-1 research institution in the Northeastern United States

Figure 2. ***Bibliometrics according to the 29 articles analyzed.***



The visualization in VOSviewer shows clusters of terms in three distinct colors, representing distinct subject areas within a field of study. The blue cluster, focused on topics such as "health-care professions" and "underrepresented minority stud," suggests a focus on equity and diversity in the health professions. The light green cluster groups together terms such as "leadership", "professional development", and

"retention", indicating studies related to professional development and retention in academic or corporate contexts. Finally, the dark green cluster, which includes "Higher Education" and "international students", focuses on higher education and the challenges and experiences of international students, likely exploring themes of adaptation and academic success in this group.

Quality Assessment

To validate and determine the impact of the studies included in the systematic review, a checklist based on the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) guidelines was used. The PRISMA guidelines are essential to detail the why, how, and findings of our systematic reviews, ensuring thorough and methodical reporting (Page et al., 2021). These guidelines allow for rigorous assessment of the quality and validity of included studies, ensuring that the results are accurate and reliable.

Table 10. ***Prisma 2020 Quality Scale***

Section and Theme	**Checklist Item**	**1 2 3 4 5 6 7 8 9 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9**
Justification	Describe the rationale for the review in the context of existing knowledge.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Objectives	Provide an explicit statement of the objective or questions that the review addresses.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Eligibility Criteria	Specify inclusion and exclusion criteria for the review	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Sources of Information	Specify all databases, registries, websites, organizations, reference lists, and other sources searched or queried to identify studies.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Search Strategy	Present complete search strategies for all databases, records, and websites, including any filters and limits used.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Selection Process	Specify the methods used to decide whether a study, including.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Data Collection Process	Specify the methods used to collect data from reports.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Data Elements	List and define all results for which data was searched.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Assessment of Study Risk of Bias	Specify the methods used to assess risk of bias in the included studies, including details of the tools used.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Measures of Effect	Specify for each outcome the measures of effect used in the synthesis or presentation of results.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Study Features	Cite each included study	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Certainty of Evidence	Present assessments of certainty in the body of evidence for each outcome assessed.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Discussion	Provide a general interpretation of the results in the context of other evidence. Discuss limitations of evidence and review processes. Discuss the implications of the results for practice, policy, and future research.	x x x x x x x x x x x x x x x x x x x x x x x x x x x
Support	Describe the sources of financial or non-financial support for the review, and the role of funders or sponsors.	x x x x x x x x x x x x x x x x x x x x x x x x x x x

Source: Own elaboration

The evaluation of the quality scale for the 29 articles shows high compliance with most of the criteria established for the systematic review. However, it is noted that some articles do not provide complete information on the data collection process and financial support, areas where transparency could be improved. Statistically, more than 95% of the articles meet each criterion, except in the data collection process and the description of financial support, where approximately 90% meet these points, indicating a high overall level of methodological rigor and detailed reporting in most of the studies reviewed.

Discussions

Student retention in higher education programs is a complex issue that involves socioeconomic, academic, and personal factors, which vary significantly according to the geographical and cultural context. Through the bibliometric analysis of studies published between 2010 and 2024.

With respect to the analysis of methodological distribution, it shows a diversified approach that seeks to understand the phenomenon of retention from different perspectives. Experimental studies, according to Álvarez (2021), have demonstrated the effectiveness of mentoring interventions in improving retention, particularly in STEM (Science, Technology, Engineering, and Mathematics) areas. These studies, according to Rosenberg et al. (2024), employ controlled methodologies to identify causal relationships, underscoring the relevance of mentoring in the development of leadership skills and self-efficacy among minority students.

Thies & Falk (2024) explores how belonging and perceived support influence the retention of STEM students from excluded groups, reinforcing the importance of a holistic approach to academic leadership.

In relation to the literature on academic retention, it has been largely dominated by American researchers, who address issues of inclusion and diversity in higher education (Ekornes, 2022). Highlighted as high-impact authors, their work has been widely cited due to their contributions to understanding how leadership and mentoring can improve retention rates. Dasgupta et al. (2015), for example, identify that mentoring in early stages can have lasting effects on the retention and professional development of women in STEM, coinciding with the observations of UNESCO (2019), which highlights the relevance of mentoring programs to reduce the gender gap in higher education in Latin America.

On the other hand, studies such as that of Mellizo-Soto (2022) on university mentoring programs in STEM have shown the importance of generating spaces of support for historically excluded students. These works underscore the need for an academic leadership structure that promotes an inclusive environment and supports diversity in the university context. These findings also align with previous research, such as that of AIR (2019), which emphasizes the importance of financial aid and social support in improving retention rates among low-income students (Chang et al., 2022).

Mentoring and academic support are considered essential to improve retention, particularly in programs with high academic demand such as STEM, Fundación CYD, (2021). These studies show that inclusive and supportive leadership has a positive impact on retention, especially for minority students. Rosenberg et al. (2024), found that students who participate in mentoring programs feel a greater sense of belonging, which increases their chances of persisting in their studies. Studies on self-efficacy and academic identity, as mentioned by Alsomaly & Metoly (2021), reveal that leadership interventions that foster a sense of competence and belonging contribute significantly to retention. Self-efficacy, understood as students' perception of their ability to succeed academically, is closely related to their persistence in higher education programs (Butler, 2024). This idea is supported by the work of Betz et al., (2021), who identify that students with high self-efficacy are more likely to overcome academic barriers, indicating the importance of leadership in the construction of a positive academic identity (Cook et al., 2019).

Limitations and Future Considerations

For future research, it is recommended to explore the role of academic leadership in other cultural contexts and to conduct longitudinal studies that analyze the effects of inclusive and supportive leadership on student retention. Another limitation of this review is that we have focused on open and English articles. It

would also be pertinent to examine the impact of leadership programs that not only focus on STEM students, but also consider other disciplines, thereby broadening the understanding of how leadership can improve academic retention in higher education.

Conclusions

The quantitative results of the article allow us to identify key factors that influence student retention in higher education, revealing a variety of patterns depending on the modality of study, areas of knowledge and socioeconomic support. The face-to-face modality shows a significantly higher retention rate compared to the distance modality, suggesting that the face-to-face environment and face-to-face interaction offer a higher level of support and engagement for students, thus improving their persistence in the program. In addition, initial academic performance is presented as an important predictor of retention; Students who pass all subjects in their first year have a high retention rate, while those who fail more than half of the subjects have considerably lower retention, indicating the importance of providing early academic support to improve student success.

Economic factors also play a key role; Approximately 30% of students who drop out of school do so for economic reasons. In this context, access to scholarships and study grants is crucial, since a significant fraction of students received some type of financial aid, which contributed to reducing the dropout rate. This finding suggests that greater investment in financial support may be decisive in reducing student dropout.

The family and social environment also significantly influences retention; Students who receive emotional and academic support from their family and friends are more likely to continue their studies compared to those who lack such support. This data highlights the importance of the social environment in the perseverance of students and suggests that educational institutions should promote programs that involve families in the educational process.

Satisfaction with the institution and the program of study is directly related to retention. Students who are satisfied with their university and program of study have a higher chance of finishing their studies compared to those who are dissatisfied. Finally, the perception of employability and job opportunities significantly influence students' decision to continue in their study programs. Students who believe that their career will offer them good job opportunities tend to continue their studies, while those who doubt their employability have a higher dropout rate.

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