HIGHER EDUCATION DROPOUT: A SCOPING REVIEW

Cassilda Alves dos Santos¹
Gabrielly de Queiroz Pereira²
Luiz Alberto Pilatti³

ABSTRACT

Objective: To identify the scope, methodologies, and emerging trends related to dropout in higher education.

Method: A scoping review using the PRISMA-ScR methodology, covering articles published between 2019 and 2023 in the databases SciELO, Web of Science, and ScienceDirect. After removing duplicates and applying inclusion and exclusion criteria, 30 articles were selected and critically evaluated to identify patterns and gaps in the literature on higher education dropout.

Results and Discussion: The main findings highlight the effectiveness of predictive models and personalized interventions in student retention and the importance of sustainable practices for the longevity of higher education institutions. Numerous factors influence dropout in higher education, and personalized interventions and sustainable practices are essential to increase retention and promote the sustainability of institutions.

Research Implications: The research highlights the need for personalized interventions and sustainable practices to reduce dropout, outlining a current framework for researchers in the field and providing elements for managers and policymakers.

Originality/Value: The study comprehensively maps the methodologies and emerging trends on higher education dropouts, using a scoping review with methodological rigor and contributing an updated and detailed view of the field.

Keywords: Higher Education Dropout, Student Retention, Educational Sustainability, Dropout Prevention.

EVASÃO NO ENSINO SUPERIOR: REVISÃO DE ESCOPO

RESUMO

Objetivo: Identificar o escopo, as metodologias e as tendências emergentes relacionadas à evasão no ensino superior.

Método: Revisão de escopo utilizando a metodologia PRISMA-ScR, abrangendo artigos publicados entre 2019 e 2023 nas bases de dados SciELO, Web of Science e ScienceDirect. Após remover duplicatas e aplicar critérios de inclusão e exclusão, 30 artigos foram selecionados e avaliados criticamente para identificar padrões e lacunas na literatura sobre evasão no ensino superior.

Resultados e Discussão: Os principais achados destacam a eficácia de modelos preditivos e intervenções personalizadas na retenção de estudantes, além da importância de práticas sustentáveis para a longevidade das instituições de ensino superior. A evasão no ensino superior é influenciada por diversos fatores e que intervenções personalizadas e práticas sustentáveis são essenciais para aumentar a retenção e promover a sustentabilidade das instituições.

¹ Instituto Federal de Tocantins (IFTO), Palmas, Tocantins, Brasil. Universidade Tecnológica Federal do Paraná, Ponta Grossa, Paraná, Brasil. E-mail: cassilda.santos@ifto.edu.br Orcid: http://orcid.org/0009-0000-2165-5012
² Universidade Estadual de Ponta Grossa (UEPG), Ponta Grossa, Paraná, Brasil. Universidade Tecnológica Federal do Paraná (UTFPR), Curitiba, Paraná, Brasil. E-mail: gabriellyp@alunos.utfpr.edu.br Orcid: http://orcid.org/0000-0003-2663-0783
³ Universidade Tecnológica Federal do Paraná, Ponta Grossa, Paraná, Brasil. E-mail: lapilatti@utfpr.edu.br Orcid: http://orcid.org/0000-0003-2679-9191
Higher education dropout is a complex and multidimensional phenomenon influenced by various contextual variables and determinants present in countries at different stages of development. This issue poses significant management challenges for public and private higher education institutions. Addressing this problem is urgent and requires complex solutions, many of which need to be implemented as policies to ensure the sustainability of higher education.
The topic of higher education dropout is not new and is part of a broader spectrum of student dropout. The literature includes various studies with different approaches, focusing on Brazilian and international realities. In addition to empirical studies, numerous literature reviews are available, many of which have been recently published in essential journals (Barroso et al., 2022; Cruz-Campos et al., 2023; Guzmán et al., 2021; Oliveira et al., 2021; Santos et al., 2022). This fact demonstrates that, despite being widely explored, the topic still presents significant gaps.

The scoping review, the approach proposed in this study, is a relatively new technique (Pham et al., 2014) used to synthesize research evidence, focusing on mapping the existing literature in a field of interest regarding the volume, nature, and characteristics of primary research (Arksey & O'Malley, 2003). This method is beneficial for topics that have not yet been extensively reviewed or are of a complex and heterogeneous nature (Mays et al., 2001). Scoping reviews are conducted to examine the extent and range of research in an area, determine the value and cost of a full systematic review, summarize research results, and identify gaps in the existing literature. The method is rigorous and transparent, serving as standalone projects or preliminary stages for systematic reviews (Arksey & O'Malley, 2003). However, a less highlighted and optional aspect of the scoping review is mapping the focus given to research over a determined period, in this case, the present time, to identify trends.

Student dropout negatively impacts society in various dimensions. The departure of students before completing their courses results in significant social, academic, and economic waste (Santos et al., 2021). In the public sector, invested resources fail to generate the expected return. In the private sector, dropout translates into substantial revenue loss. Additionally, both sectors suffer from underutilization of teachers, staff, equipment, and physical spaces, resulting in inefficiencies and additional costs.

Mitigating this impact is directly linked to public policies, management, and sustainability. Recent literature reviews show that there are no new variables causing dropout (Barroso et al., 2022; Cruz-Campos et al., 2023; Guzmán et al., 2021; Oliveira et al., 2021; Santos et al., 2022), although there is a current devaluation of higher education. In the public sector, a lack of adequate funding and support can hinder the implementation of effective strategies to reduce dropout. In the private sector, the pursuit of profit can lead to reduced investments in student support programs, aggravating the problem. Thus, policies that do not prioritize adequate funding and necessary support end up making public and private institutions less sustainable (Ferreira & Pilatti, 2013), mainly from social and economic perspectives.
Based on the identified gap in the literature and the topic's relevance, this study aims to conduct a scoping review on higher education dropout. The objective is to identify, in the research published in the last five years, the scope, methodologies, findings, and emerging trends related to higher education dropout.

This study aims to contribute to understanding the higher education dropout phenomenon, providing an updated framework for researchers, educational managers, and policymakers. Identifying current trends is expected to support the development of more targeted and effective interventions, promoting excellent student retention and the sustainability of higher education.

2 METHOD

The research is a scoping review (Pham et al., 2014). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols for Scoping Reviews (PRISMA-ScR) extension was used (Tricco et al., 2018). The protocol was registered on the Open Science Framework, 10.17605/OSF.IO/A79WE.

The research corpus was constructed through searches in the SciELO, Web of Science, and ScienceDirect databases in October 2023. The research was restricted to articles as the document type, covering the last five years (2019 to 2023).

The search strategy was designed based on the following research question: "What are the scope, methodologies, findings, and emerging trends related to higher education dropout in research published in the last five years?". For the search, the descriptors ("dropout") AND ("higher education") were used, with the restriction of considering only the article titles as the keyword occurrence location. Only scientific articles published in journals were considered in the search.

Mendeley software was used to remove duplicate documents from the databases. For the selection of studies, the search, inclusion, and exclusion criteria were followed according to the model recommended by the Cochrane Collaboration (2010), which follows a rigorous process of identification, selection, eligibility, and inclusion. The evaluation of excluded and included articles was analyzed and discussed by two researchers based on the reading of titles and abstracts, and when these were not sufficiently clear, the full texts. When there was a divergence of opinion, a third researcher made the decision.

After the search process, the selected articles were critically evaluated using the InOrdinatio classification proposed by Methodi Ordinatio (Pagani et al., 2015). Only studies
with positive results in the equation were considered. This second filter made the classification even more robust.

After selecting the final articles for the review, data were collected regarding the characteristics of the articles: authors, objective, country, and year. The articles were analyzed based on grouping articles by addressed themes, employed methodologies, and obtained results. This grouping allowed for the identification of patterns and gaps in the literature, facilitating data synthesis and the identification of trends and challenges in the study area.

3 RESULTS

According to the established search criteria, a total of 75 articles were identified through searches conducted in the Web of Science (59 articles), ScienceDirect (4 articles), and SciELO (12 articles) databases. Subsequently, the search, inclusion, and exclusion process was carried out, and 30 articles were selected, as recommended by the Cochrane Collaboration model (Figure 1).

Figure 1
Flowchart of the search, inclusion, and exclusion process

Source: Adapted from Cochrane Collaboration (2010).
The 30 articles eligible for the study were positioned and critically evaluated according to the InOrdinatio equation (Pagani et al., 2015), with all obtaining favorable results. In applying the equation, a value of 10 was used for $\alpha$ contained in the equation. Table 1 presents the research corpus based on the established classification:

**Table 1**

*Research corpus*

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study Objective</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Olaya et al. (2020)</td>
<td>Improve the design of retention programs, adapting them so that students are more likely to be retained if targeted by specific interventions.</td>
<td>Chile</td>
</tr>
<tr>
<td>2 Scheunemann et al. (2022)</td>
<td>Explore three waves of reciprocal relationships between academic procrastination, study satisfaction, academic dropout, and dropout intentions within a semester.</td>
<td>Germany</td>
</tr>
<tr>
<td>3 Von Hippel, &amp; Hofflinger (2021)</td>
<td>Demonstrate how using data-based predictive models can identify students at dropout risk and improve the effectiveness of retention interventions at Chilean universities.</td>
<td>Chile</td>
</tr>
<tr>
<td>4 Herbaut (2021)</td>
<td>Investigate the relationship between social origin, academic failure in the first year of higher education, and dropout behavior in the context of low financial costs for higher education.</td>
<td>France</td>
</tr>
<tr>
<td>5 Saccaro et al. (2019)</td>
<td>Analyze variables that influence dropout.</td>
<td>Brazil</td>
</tr>
<tr>
<td>6 Wild, &amp; Heuling (2020)</td>
<td>Understand the factors influencing dropout in cooperative study programs in Germany.</td>
<td>Germany</td>
</tr>
<tr>
<td>7 L. Silva et al. (2022)</td>
<td>Investigate how institutional analysis can be integrated into institutional practices to overcome academic problems and support students facing difficulties achieving their academic goals.</td>
<td>Estonia</td>
</tr>
<tr>
<td>8 Acevedo (2021)</td>
<td>Identify the main explanatory factors of dropout in higher education in Rivera.</td>
<td>Uruguay</td>
</tr>
<tr>
<td>9 Simón, &amp; Puerta (2022)</td>
<td>Predict early dropout in higher education using the College Persistence Questionnaire (CPQ) to analyze differences in dimensions of academic and social integration, course commitment, university stress, academic advising, motivation, academic awareness, institutional commitment, financial strain, and academic efficacy between students who persist and those who drop out.</td>
<td>Spain</td>
</tr>
<tr>
<td>10 Gallego et al. (2021)</td>
<td>Identify students at risk of academic dropout in higher education.</td>
<td>Spain</td>
</tr>
<tr>
<td>11 Alvarado-Uribe et al. (2022).</td>
<td>Describe a dataset of students from Tecnológico de Monterrey, Mexico, aimed at predicting higher education dropout.</td>
<td>Mexico</td>
</tr>
<tr>
<td>12 Gutierrez-Pachas et al. (2023)</td>
<td>Compare different computational methods for predicting higher education dropout using machine learning approaches and survival analysis techniques to predict who will drop out and when it will occur.</td>
<td>Latin America</td>
</tr>
<tr>
<td>13 Hoffmann et al. (2019)</td>
<td>Propose a methodology for systematizing the analysis of dropout rates in Brazilian higher education.</td>
<td>Brazil</td>
</tr>
<tr>
<td>14 Viloria et al. (2019)</td>
<td>Propose a new simple Bayesian classifier (SBND) with a Markov network structure from the class variable.</td>
<td>India</td>
</tr>
<tr>
<td>15 Marques (2020)</td>
<td>Analyze microdata from the Higher Education Census from 2009 to 2017 on the return to studies of students who dropped out of higher education.</td>
<td>Brazil</td>
</tr>
<tr>
<td>16 Flores et al. (2022)</td>
<td>Analyze eight predictive models to forecast university dropout.</td>
<td>Peru</td>
</tr>
<tr>
<td>17 D. Silva et al. (2022)</td>
<td>Analyze the academic situation and the meaning of dropout experiences from the perspective of students at the University of São Paulo (USP) from 2010 to 2020.</td>
<td>Brazil</td>
</tr>
<tr>
<td>No.</td>
<td>Author(s) (Year)</td>
<td>Title/Abstract</td>
</tr>
<tr>
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</tr>
<tr>
<td>18</td>
<td>Acevedo Calamet (2020)</td>
<td>Analyze the factors with the most significant impact on dropout in three higher education centers located in socio-academic disadvantaged contexts in Rivera.</td>
</tr>
<tr>
<td>19</td>
<td>Silva et al. (2020)</td>
<td>Propose predictive statistical models for managing dropout in undergraduate courses at a Brazilian higher education institution.</td>
</tr>
<tr>
<td>20</td>
<td>Wild et al. (2023)</td>
<td>Analyze the effects of satisfaction of the three basic psychological needs (autonomy, competence, and relatedness) on higher education dropout, mediated by interest in the subject matter.</td>
</tr>
<tr>
<td>21</td>
<td>Tiefen (2019)</td>
<td>Examine the relationship between participation in math remediation courses and dropout among engineering students.</td>
</tr>
<tr>
<td>22</td>
<td>Fior et al. (2022)</td>
<td>Analyze the direct and mediated impacts of self-efficacy, performance, gender, age, receipt of social assistance scholarships, and enrollment in preferred courses on dropout.</td>
</tr>
<tr>
<td>23</td>
<td>Amiel et al. (2021)</td>
<td>Identify predictors of potential dropout reasons among 385 employed and 397 unemployed university students.</td>
</tr>
<tr>
<td>24</td>
<td>Barbosa e Silva, &amp; Mariano (2021)</td>
<td>Problematize the definition of higher education dropout used by INEP/MEC.</td>
</tr>
<tr>
<td>25</td>
<td>Hinojosa et al. (2022)</td>
<td>Identify the profile of students at risk of dropout to generate student management plans that impact the variables explaining this situation.</td>
</tr>
<tr>
<td>26</td>
<td>Negreiros et al. (2021)</td>
<td>Propose statistical treatment to investigate possible causes of dropout at a higher education institution.</td>
</tr>
<tr>
<td>27</td>
<td>Nierotka et al. (2023)</td>
<td>Investigate which characteristics of students and the higher education institution are associated with dropout and course completion.</td>
</tr>
<tr>
<td>28</td>
<td>Marczuk, &amp; Strauss (2023)</td>
<td>Understand how study conditions differently impact the dropout intentions of men and women.</td>
</tr>
<tr>
<td>29</td>
<td>Zając et al. (2024)</td>
<td>Analyze the associations between student mental health and higher education dropout.</td>
</tr>
<tr>
<td>30</td>
<td>Lara-Cabrera et al. (2023)</td>
<td>Verify whether using physical and virtual badges improves student performance and reduces dropout rates in STEM courses in higher education.</td>
</tr>
</tbody>
</table>

Source: Own authorship.

Criteria based on the objectives and approaches of the articles were adopted to organize and classify the studies that comprise the research corpus. Initially, the studies were divided into two major groups: the first group includes those focused on developing products, such as tools, methodologies, or specific systems to solve dropout problems in higher education. The second group consists of scientific studies investigating various aspects related to dropout, subdivided into thematic categories according to their approaches.

The first group, composed of five articles, focuses on creating or improving specific interventions and methodologies. The studies by Olaya et al. (2020), Von Hippel and Hofflinger (2021), Viloria, Lezama, and Varela (2019), Hoffmann, Nunes, and Muller (2019), and Silva, Cabral, and Pacheco (2020) demonstrate this product development effort.

The second group, composed of 25 articles, was categorized as "scientific studies" and subdivided into six thematic categories according to the similarity of their objectives and approaches. The categories and the studies allocated to each category are presented in Table 2.
Table 2

Thematic categories of scientific studies on higher education dropout

<table>
<thead>
<tr>
<th>Thematic Categories</th>
<th>Study</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal and Psychological Factors</td>
<td>Scheunemann et al. (2022), Wild et al. (2023), Fior et al. (2022), Zając et al. (2024), Ambiel et al. (2021).</td>
<td>5</td>
</tr>
<tr>
<td>Data Analysis and Predictive Models</td>
<td>Simón, &amp; Puerta (2022), Gallego et al. (2021), Alvarado-Uribe et al. (2022), Gutierrez-Pachas et al. (2023), Flores et al. (2022), Hinojosa et al. (2022).</td>
<td>7</td>
</tr>
<tr>
<td>Institutional Approaches and Educational Policies</td>
<td>L. Silva et al. (2022), D. Silva et al. (2022), Barbosa e Silva, &amp; Mariano (2021), Nierotka et al. (2023), Marques (2020).</td>
<td>5</td>
</tr>
<tr>
<td>Specific Interventions</td>
<td>Lara-Cabrera et al. (2023).</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Own authorship

This thematic classification provides an organized view of the scope of the analyzed scientific studies. Eight main groups were identified based on similarity for a more detailed understanding of the methods employed in higher education dropout studies. Table 3 presents these groups, listing the corresponding studies and the total number of articles in each category.

Table 3

Leading groups of methods employed in higher education dropout studies

<table>
<thead>
<tr>
<th>Group</th>
<th>Study</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictive Modeling and Data Analysis</td>
<td>Von Hippel, &amp; Hofflinger (2021), Alvarado-Uribe et al. (2022), Gutierrez-Pachas et al. (2023), Silva et al. (2020), Simón, &amp; Puerta (2022), Gallego et al. (2021), Negreiros et al. (2021).</td>
<td>7</td>
</tr>
<tr>
<td>Longitudinal Studies</td>
<td>Scheunemann et al. (2022), Saccaro et al. (2019), Wild, &amp; Heuling (2020), Herbaut (2021), Nierotka et al. (2023), Zając et al. (2024).</td>
<td>6</td>
</tr>
<tr>
<td>Qualitative Studies and Focus Groups</td>
<td>Acevedo (2021), L. Silva et al. (2022), Acevedo Calamet (2020), Barbosa e Silva, &amp; Mariano (2021).</td>
<td>4</td>
</tr>
<tr>
<td>Statistical Analysis and Modeling</td>
<td>Fior et al. (2022), Ambiel et al. (2021), Hinojosa et al. (2022), Tieben (2019), Marczuk, &amp; Strauss (2023).</td>
<td>5</td>
</tr>
<tr>
<td>Specific Methodologies for Dropout Analysis</td>
<td>Olaya et al. (2020), Hoffmann et al. (2019), Marques (2020), Wild et al. (2023).</td>
<td>4</td>
</tr>
<tr>
<td>Documentary Studies</td>
<td>D. Silva et al. (2022).</td>
<td>1</td>
</tr>
<tr>
<td>Model Comparison and Validation</td>
<td>Flores et al. (2022), Viloria et al. (2019)</td>
<td>2</td>
</tr>
<tr>
<td>Quasi-Experimental Studies</td>
<td>Lara-Cabrera et al. (2023).</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Own authorship.
4 DISCUSSIONS

4.1 SCOPE OF THE STUDIES COMPRISING THE RESEARCH CORPUS

The product development group consists of five studies that focus on creating or improving specific interventions and methodologies to address issues related to higher education dropout. These studies demonstrate efforts in building tools and systems to identify and mitigate the factors that lead to student dropout. Olaya et al. (2020) sought to improve the design of retention programs for students at risk of dropping out by adapting specific interventions to increase their effectiveness. Von Hippel and Hofflinger (2021) developed predictive analytical tools to identify students at risk of dropping out of Chilean universities, enhancing the effectiveness of retention interventions. Viloria et al. (2019) proposed a new simple Bayesian classifier (SBND) to predict higher education dropout with research conducted in India. Silva et al. (2020) developed predictive statistical models for managing dropout in undergraduate courses in Brazil, aiming to identify risk factors and implement effective strategies. Hoffman et al. (2019) presented a methodology to systematize the analysis of dropout rates in Brazilian higher education, using data from the Higher Education Census for organizational knowledge management.

The scientific studies group comprises 25 articles investigating various aspects of higher education dropout. These studies were subdivided into six thematic categories based on the similarity of their objectives and approaches. The categories include personal and psychological factors, social and economic factors, data analysis and predictive models, institutional approaches and educational policies, academic and curricular factors, and specific interventions (Table 2).

The first category includes studies exploring personal and psychological factors associated with dropout. Scheunemann et al. (2022) analyzed the reciprocal relationships between academic procrastination, study satisfaction, academic withdrawal, and dropout intentions, investigating how these factors interact over a semester in Germany. Wild et al. (2023) examined the effects of satisfaction of basic psychological needs - autonomy, competence, and relatedness - on higher education dropout in a study conducted in Germany. Fior et al. (2022) investigated the direct and mediated impacts of self-efficacy, academic performance, gender, age, receipt of social assistance scholarships, and enrollment in preferred courses on dropout in Brazil. Zając et al. (2024) analyzed the associations between student mental health and higher education dropout in Australia, aiming to understand how mental
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health issues can influence academic withdrawal. Ambiel et al. (2021) identified predictors of potential higher education dropout reasons among employed and unemployed students in Brazil, focusing on variables such as stress, course satisfaction, and working conditions.

The second category covers studies that analyze social and economic factors influencing academic withdrawal. Herbaut (2021) investigated the relationship between social origin, academic failure in the first year of higher education, and dropout behavior in the context of low financial costs for higher education in France, highlighting social inequalities and their impact on the continuity of studies. Acevedo (2021) identified the main explanatory factors of higher education dropout in Rivera, Uruguay, analyzing how socioeconomic variables and family contexts influence the decision to abandon studies. Acevedo Calamet (2020) analyzed the most significant impact on study abandonment factors in three higher education centers in socio-academically disadvantaged contexts in Rivera, Uruguay, highlighting the influence of adverse economic and social factors. Marczuk and Strauss (2023) examined how study conditions differently impact the dropout intentions of men and women in Germany, focusing on gender disparities and their implications for academic persistence.

The third category focuses on data analysis and predictive models to forecast and understand dropout. Simón and Puerta (2022) used the College Persistence Questionnaire (CPQ) to predict early dropout in higher education, analyzing differences in dimensions such as academic and social integration, course commitment, university stress, and other factors in Spain. Gallego et al. (2021) identified students at risk of academic dropout in higher education through predictive analysis methods, contributing to creating more targeted interventions in Spain. Alvarado-Uribe et al. (2022) described a dataset of students from Tecnológico de Monterrey in Mexico, aiming to predict higher education dropout, highlighting the importance of data collection and analysis for identifying risk factors. Gutierrez-Pachas et al. (2023) compared different computational methods, including machine learning and survival analysis techniques, to predict higher education dropout in various contexts in Latin America. Flores et al. (2022) analyzed eight predictive models to forecast university dropout in Peru, demonstrating the effectiveness of different analytical approaches. Hinojosa et al. (2022) identified the profile of students at risk of dropout in Chile to generate student management plans that impact the explanatory variables of dropout. Negreiros et al. (2021) proposed a statistical treatment to investigate possible causes of dropout at a higher education institution in Brazil, providing indicators for educational management.

The fourth category deals with institutional approaches and educational policies. L. Silva et al. (2022) integrated institutional analysis into practices to overcome academic
problems and support students, seeking ways to improve the educational environment. D. Silva et al. (2022) analyzed the academic situation and the significance of dropout experiences at the University of São Paulo (USP) from 2010 to 2020, providing a detailed view of the causes and consequences of dropout at one of Brazil's leading universities. Barbosa et al. (2021) problematized the official and prevailing definition of higher education dropout used by INEP/MEC, highlighting the implications of these definitions for higher education policies. Nierotka et al. (2023) investigated which characteristics of students and higher education institutions are associated with dropout and course completion, contributing to more effective educational policies. Marques (2020) analyzed microdata from the Higher Education Census from 2009 to 2017 on the return to studies of students who had dropped out of higher education, discussing the re-entry of students into the Brazilian educational system.

The fifth category examines academic and curricular factors that affect dropout. Wild and Heuling (2020) investigated the factors that influence dropout in cooperative study programs in Germany, highlighting the importance of adapting curricula and teaching methods to the needs of students. Tieben (2019) examined the relationship between participation in math remediation courses and dropout among engineering students in Germany, suggesting that specific academic interventions can reduce dropout. Saccaro et al. (2019) analyzed variables that influence higher education dropout in Brazil, using a survival analysis approach to better understand the factors that lead to student withdrawal in Science, Mathematics, Computing, Engineering, Production, and Construction courses.

Finally, the sixth category investigates specific interventions to reduce dropout. Lara-Cabrera et al. (2023) examined whether the use of physical and virtual badges improves student performance and reduces dropout rates in STEM courses in higher education in Spain.

The analysis of the two study groups reveals a comprehensive effort to address higher education dropouts from different perspectives. The product development group focuses on creating and enhancing specific tools and methodologies to identify and mitigate the factors contributing to student dropout. These studies demonstrate a commitment to innovation and the practical implementation of solutions.

On the other hand, the scientific studies group encompasses a broader and deeper analysis of the factors influencing dropout, organized into six thematic categories: personal and psychological factors, social and economic factors, data analysis and predictive models, institutional approaches and educational policies, academic and curricular factors, and specific interventions. Each category addresses different dropout dimensions, providing a multifaceted understanding of the issue.
Within the scope of the studies, the main trends identified were innovation in tools and methodologies, data analysis and predictive models, and social and economic factors. These trends indicate a coordinated effort of practical innovation and detailed scientific analysis to address dropout comprehensively and integratively, considering immediate solutions and the underlying factors influencing the problem.

4.2 METHODS USED IN STUDIES ON HIGHER EDUCATION DROPOUT

It was possible to identify eight main groups of methods in the research corpus based on the similarity of the approaches employed (Table 3):

1. Predictive Modeling and Data Analysis: Advanced techniques such as machine learning and logistic regression were used to predict dropout and identify students at risk (Von Hippel & Hofflinger, 2021; Alvarado-Uribe et al., 2022; Gutierrez-Pachas et al., 2023; Silva et al., 2020; Simón & Puerta, 2022; Gallego et al., 2021; Negreiros et al., 2021);

2. Longitudinal Studies: Analyses over time to understand patterns and determinants of dropout using latent cross-panel models and event history analysis (Scheunemann et al., 2022; Saccaro et al., 2019; Wild & Heuling, 2020; Herbaut, 2021; Nierotka et al., 2023; Zając et al., 2024);

3. Qualitative Methods: Interviews and focus groups to explore the reasons and factors behind dropout (Acevedo, 2021; L. Silva et al.; Acevedo Calamet, 2020; Barbosa et al., 2021);

4. Advanced Statistical Methods: Structural equation modeling, regression, and principal component analysis to examine predictors and profiles of students at risk (Fior et al., 2022; Ambiel et al., 2021; Hinojosa et al., 2022; Tieben, 2019; Marczuk & Strauss, 2023);

5. Specific Methodologies: Application of "uplift modeling" and microdata analysis to improve retention programs (Olaya et al., 2020; Hoffmann et al., 2019; Marques, 2020; Wild et al., 2023);

6. Documentary Analysis: Documentary procedures to understand the causes and consequences of dropout (D. Silva et al., 2022);

7. Predictive Model Comparison: Evaluation of different models and classifiers to predict dropout (Flores et al., 2022; Viloria et al., 2019);

These methodological groupings allow for a detailed analysis of the approaches to investigating and mitigating higher education dropout. The diversity of applied methods reflects the complexity of the dropout phenomenon and the need for multifaceted strategies to combat it. From predictive analyses and longitudinal studies to qualitative and quasi-experimental methodologies, each group of studies contributes uniquely to understanding the factors that influence dropout. This organization facilitates comparison between studies, promoting an integrated view of best practices and evidence that can guide effective interventions and more effective educational policies.

4.3 MAIN FINDINGS AND TRENDS IN STUDIES ON HIGHER EDUCATION DROPOUT

Higher education dropout is a global phenomenon that affects individuals, organizations, and society. Reducing dropout rates has been a priority for governments and administrators, but it remains a challenge, especially in Brazil. Mitigating this problem is closely linked to public policies, management, and sustainability. The main findings from the studies are as follows:

- **Identification and Prevention:** Predictive models, such as machine learning and uplift modeling, are effective in identifying at-risk students and enabling targeted interventions (Olaya et al., 2020; Von Hippel & Hofflinger, 2021; Gutierrez-Pachas et al., 2023);
- **Personal and Psychological Factors:** Satisfaction of basic psychological needs and self-efficacy significantly impact student retention; mental health issues are also essential predictors (Wild et al., 2023; Fior et al., 2022; Zając et al., 2024);
- **Social and Economic Factors:** Social and economic inequalities increase dropout risk, while financial aid improves retention (Herbaut, 2021; Acevedo, 2021; Saccaro et al., 2019);
- **Institutional Approaches and Educational Policies:** The definition and measurement of dropout vary, affecting the comparability of results and the effectiveness of policies (Barbosa et al., 2021; Santos et al., 2022);
- **Practical Interventions:** Mentorship programs and financial support have proven effective in various contexts (Lara-Cabrera et al., 2023; Marques, 2020).

Future Trends:
• Integration of Advanced Technologies: Increasing machine learning and AI use to predict and personalize interventions;
• Longitudinal Studies: Mapping student trajectories to identify critical risk moments;
• Qualitative and Mixed Approaches: Combining methods for a holistic understanding of dropout reasons;
• Focus on Mental Health: Developing interventions that address students' psychological well-being;
• Personalization of Interventions: Adapting retention programs to students' characteristics;
• Social and Economic Inequalities: Policies that promote equity in higher education access and retention;
• Policy Evaluation: Continuous evaluation and improvement of evidence-based educational policies;
• Contextualized Practical Interventions: Developing interventions that consider students' specific contexts;
• Reevaluation of Definitions: Establishing clear criteria for defining and measuring dropout;
• Sustainability and Innovation: Integrating sustainable practices to promote a supportive retention environment.

These trends highlight the need for integrated and personalized approaches to mitigate higher education dropout, which is essential for the sustainability of this level of education.

5 CONCLUSIONS

This study conducted a scoping review on higher education dropout, examining research from the past five years. The findings indicate that dropout is a complex phenomenon influenced by personal, psychological, social, economic, and institutional factors. Predictive models and personalized interventions are promising for mitigating dropout, and considering students' mental health is essential for retention. Future trends highlight the importance of integrating advanced technologies, longitudinal studies, and mixed approaches. Personalizing interventions and reevaluating dropout definitions are crucial for effective educational policies. Focusing on sustainable practices in higher education is fundamental to increasing retention and promoting the sustainability of institutions. This study guides researchers, educational
managers, and policymakers, hoping that this information will lead to more effective interventions for sustainability and retention in higher education.

REFERENCES


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