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Digital Enhancement: Applying Generative AI In Students Decision Making Process

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Master in Computer Science and Management

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TECNOLOGIAS
E ARQUITETURA

Department of Information Science and Technology

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Resumo

A Inteligência Artificial (IA) Generativa surgiu como uma tecnologia com o potencial de revolucionar várias indústrias, incluindo a educação. Esta pesquisa tem como objetivo explorar o uso da IA generativa no setor educacional, examinando especificamente, a sua aplicação no processo de tomada de decisão dos alunos.

Foi identificado que o processo de auxiliar os alunos a escolher um tema de tese para a sua dissertação, apresenta uma falta significativa de automação e assistência, sendo que IA generativa poderia contribuir significativamente nesse contexto.

Para endereçar este problema, o objetivo principal deste estudo foi criar um Sistema de Suporte à Decisão (SSD) que incorpora IA generativa para assistir os alunos na escolha de temas de tese de mestrado.

A plataforma criada oferece orientação personalizada, simplifica o processo de tomada de decisão e melhora a comunicação entre alunos e professores orientadores. As principais funcionalidades potenciadas pela IA, fornecem inspiração e assistência aos alunos, permitindo-lhes gerar ideias de tese personalizadas com base nos seus interesses académicos.

Este estudo utiliza a metodologia de Design Science Research (DSR), com entrevistas servindo como dados cruciais para o aprimoramento das funcionalidades da plataforma.

Constatou-se que a plataforma acrescenta valor à experiência académica ao simplificar o processo de seleção de teses e promove uma melhor relação entre alunos e docentes. Esta inovação não só simplifica a tomada de decisão, mas também aprimora a colaboração, enriquecendo, a jornada educacional tanto para os alunos como para os seus orientadores.

Palavras-chave: IA Generativa, Educação, Projetos Académicos, Tomada de Decisão

Abstract

Generative Artificial Intelligence (AI) has emerged as a disruptive technology with the potential to revolutionize many industries, including education. For this purpose, this research aims to explore the application of generative AI within the educational sector, specifically focusing on its role in supporting student decision-making processes.

The process of helping students choose their master's thesis topic was found to be significantly lacking in automation and assistance, with generative AI having the potential to contribute to the educational sector, particularly in assisting students with selecting their thesis themes.

To address this problem, the key objective of the study was to create a Decision Support System (DSS) that incorporates generative AI to help students choose master's thesis topics.

The platform created offers personalized guidance, simplifies the decision-making process, and enhances communication between students and supervising professors. Key AI-powered features, where implemented, to provide inspiration and assistance to students, allowing them to generate customized thesis ideas based on their academic interests and goals.

This study employs the Design Science Research (DSR) methodology, with interviews serving as crucial data points for refining the platform's features.

It was determined that the platform created adds value to the academic experience by streamlining the thesis selection process and fostering better connections between students and faculty. This innovation not only simplifies decision-making but also enhances collaboration, ultimately enriching the educational journey for both students and their academic mentors.

Keywords: Generative AI, Education, Academic Projects, Decision Making

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List of Acronyms

AI	-	Artificial Intelligence
API	-	Application Programming Interface
DSR	-	Design Science Research
IDC	-	International Data Corporation
SLR	-	Systematic Literature Review

CHAPTER 1

Introduction

In the era of digital transformation, we find ourselves in, artificial intelligence (AI) has had a profound and transformative impact on virtually every aspect of our lives. Despite being a relatively recent topic, AI is in constant evolution and discovery, driving significant advancements in a variety of fields and promising a future filled with remarkable innovations (Dwivedi et al., 2023).

According to International Data Corporation (IDC), the four mentioned branches in the Figure 1 below are the most explored and robust ones. Generative AI, a branch of artificial intelligence, is a powerful tool for creating new data that resembles existing datasets (Nalini, 2023). It has been successfully applied to Bayesian computation, particularly in the development of deep quantile neural networks for inference and decision making (Polson, 2023).

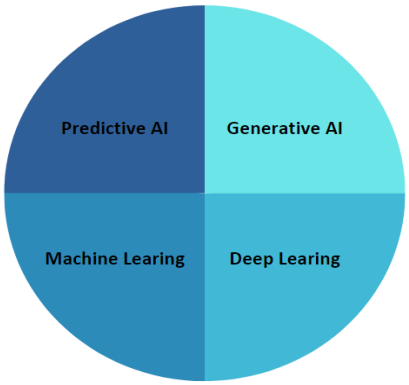


Figure 1. AI branches

There are different 'fronts of attack' for AI in the industry, ranging from the healthcare sector, automotive, education, and many more (Dwivedi et al., 2021). It has brought automated processes, improved decision-making, and made operations more efficient, revolutionizing the way we approach various fields (Cubric, 2020).

Education, despite the digital age we find ourselves in, is one of the sectors that still lacks significantly in terms of digital transformation. Unfortunately, many educational institutions face challenges in adopting and harnessing the full potential of technology to enhance learning outcomes and accessibility. Insufficient professional development and training stand out as the primary factors contributing to the limited adoption of technology in classroom settings (Ertmer et al., 2012).

It is also noteworthy, a lack of digitalization in decision-making processes in various sectors, with many institutions often maintaining their traditional methods (Vasilev et al., 2020). This discrepancy is particularly evident in the development of digital competencies, where universities and the real sector

of the economy differ (Vasilev et al., 2020). In local government institutions, the model of business based on a network of interaction is seen as efficient in the digital economy, but the integration of digital technologies into existing operating models is also important (Shvedun & Seidova-Bohoslovska, 2022). Institutional barriers, such as outdated laws and a culture of paper document flows, can hinder the digitalization of government budgeting in developing countries (Effah & Nuhu, 2017).

The involvement of Generative AI in decision-making processes in the education sector could revolutionize and enhance the efficiency of students' and teachers' projects. Moreover, Generative AI has the capacity to transform the assessment process, equipping teachers with more extensive insights into student performance (Gilmurray, 2023).

The significance of this research lies in the transformative impact it can have on how students navigate the myriad choices and challenges they encounter throughout their academic journeys.

Once the studies are collected, all challenges and opportunities encountered in the integration of generative AI in education will be analysed. These insights will be taken into account in defining the requirements for constructing this Decision Support System.

This research aims to develop a Decision Support System for students by integrating generative AI, thereby providing assistance and facilitating their decision-making process. Therefore, our objective is to apply generative AI in students' decision-making by creating a platform for use by both students and teachers.

CHAPTER 2

Related Work

In order to gain insight into the work already completed, a Systematic Literature Review (SLR), was conducted. This methodology, according to Kitchenham (2009), is the best way to identify and analyse all relevant research conducted up to the present, summarizing and identifying any existing gaps.

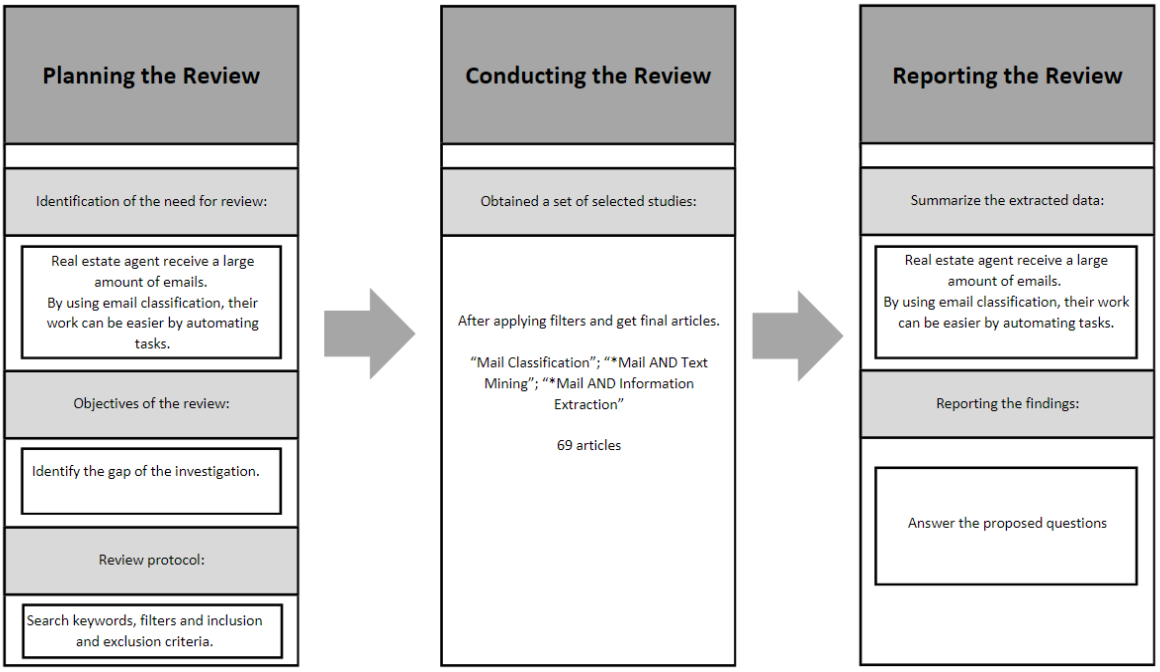


Figure 2. Phases of the SLR

According to Kitchenham's methodology (2009), this approach consists of three fundamental steps: 1 Planning, 2 Conducting, and 3 Reporting.

2.1. Planning

This section marks the initial stage in SLR methodology. It outlines the rationale for conducting the review, outlines the research questions, and establishes the review protocol.

2.1.1. Need for the Review

The introduction of ChatGPT, an open-source AI platform, in November 2022 (Ajevski et al., 2023), followed by the expansion of similar AI platforms, including Google's Bard, Microsoft's GPT-enabled Bing, and more recently Google's Gemini. These advancements present both new opportunities and challenges for education. (Sullivan et al., 2023; van Slyke et al., 2023)

Given the novelty of these technologies, numerous potential adaptations arise, and the education sector is at the forefront, posing a multitude of questions and proposals.

This SLR aims to comprehensively identify all relevant research exploring the potential application of generative AI in education, along with the associated challenges and opportunities. It also aims to demonstrate that using generative AI to support students in decision-making for choosing dissertation topics has yet to be thoroughly explored.

2.1.2. Research Questions

The primary goals of this review are to address the following questions:

RQ.1 In what contexts can Generative AI be applied in the educational sector?

RQ.2 What are the main opportunities and challenges in the potential use of Generative AI in the educational sector?

2.1.3. Review Protocol

The Databases considered for the search are:

- ACM Digital Library, https://dl.acm.org/
- IEEE Xplore Digital Library, https://ieeexplore.ieee.org/Xplore/home.jsp
- SCOPUS, https://www.scopus.com
- Emerald, https://www.emerald.com/insight/advanced-search

2.2. Conducting the Review

This section signifies the second stage in the SLR methodology. It describes the application of the protocol and the analysis of the extracted data.

2.2.1. Identification of Research

Taking into account the description in point 2.1.1.2. Research Questions, it was possible to extract the following keywords, which, when combined, form the following search string.

Table 1. Keywords and Search String

Keywords	Generative AI, Education, Academic Projects, Decision Making
Search String	("Generative AI") AND (Education OR ("Decision Making") OR ("Academic Projects"))

2.2.2. Selection of Studies

The **Table 2** below lists the filters used to conduct the selection of studies.

Table 2. Filter Applied

Filter	Type
1	Abstract
2	Jornals/Articles
3	2015-2023
4	English
5	Manual

The process was initiated by conducting an initial search of the selected search string across these databases, initially without any filters, encompassing all fields. Subsequently, the first filter was introduced, "Abstract," which led to a reduction in the number of studies from 945 to 93. The application of the second filter, "Journals and Articles," further narrowed down the selection to 77 studies. Despite implementing the third filter, "2015-2023," the number of studies remained consistent. The application of the fourth filter, "English," resulted in a final count of 75 studies. After a manual review, reading all 75 studies and eliminating any studies that deviated from the research's intended scope, arriving at a final selection of 28 studies, deemed the most relevant for the study. Table 2 and Figure 4, synthesis the process through the selection of the studies.

Table 3. Filtration Process

Database	No Filter	Filter 1	Filter 2	Filter 3	Filter 4	Filter 5
ACM Digital Library	246	14	14	14	14	3
IEEE Xplore Digital Library	19	0	0	0	0	0
SCOPUS	629	79	63	63	61	25
Emerald	51	0	0	0	0	0
Total	**945**	**93**	**77**	**77**	**75**	**28**

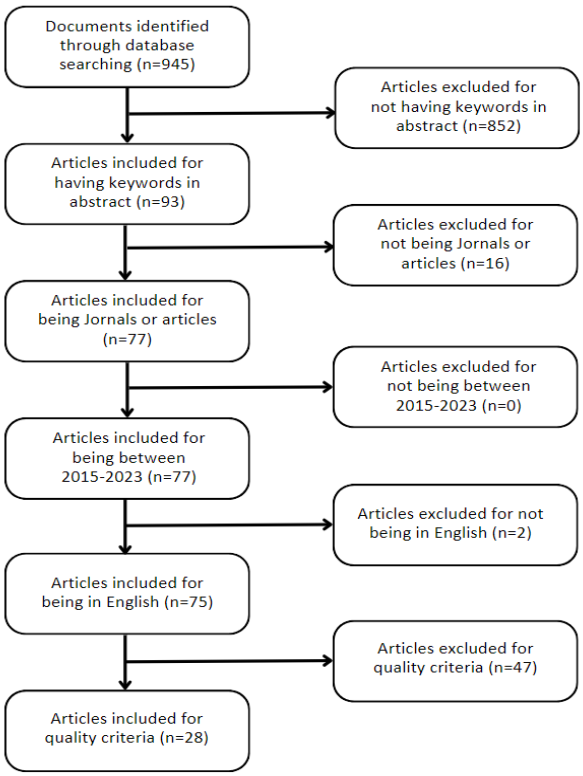
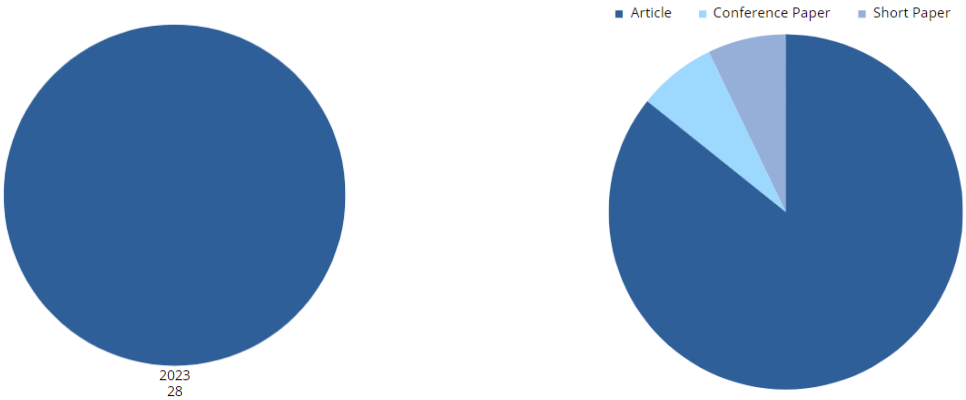


Figure 3. Flow of all filtration process

2.2.3. Extraction and Analysis of Data



(b) Year ratio (a) Conferences and journals ratio

Figure 4. Statistics

Among the 28 selected studies, the article distribution is predominantly 85,71%, with 7,14% being conference papers and 7,14% being short papers, as illustrated in Figure 4.

While the idea of AI had been discussed since 1950, with notable contributions from Alan Turing, the term "Artificial Intelligence" was coined by John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon in 1956 during the Dartmouth Conference (Lindeque, 2023). Notwithstanding all

these considerations, in the year of 2022, there has been a remarkable surge in AI, largely propelled by the increasing prominence of machine learning algorithms. This accounts for the fact that the 28 selected studies are centred around developments in 2023. It underscores that this domain is in a perpetual state of exploration and evolution.

2.3. Reporting

This section marks the concluding phase of the SLR methodology, encapsulating the extracted data and providing responses to the outlined research inquiries.

2.3.1 Summarization of Extracted Data

After analysing the 28 selected studies, it was possible to identify several themes that relate generative AI to education in different ways. These themes were then grouped into four main topics: Use of Generative AI in education, Students voice and Teaching practices, Integration of Generative AI in Specific Context and Assessment Practices, and AI Literacy. Table 4 shows the articles that fall into each different main topic.

Table 4. References for each main topic identified.

Main Topics	References by ID	Total
Use of Generative AI in education	1, 2, 6, 10, 15, 19, 23	6
Student voice and Teaching practices	3, 11, 24, 25, 26	4
Integration of Generative AI in Specific Context	4, 7, 14	5
Assessment practices and AI literacy	1, 6, 9, 12, 22, 25, 26	5

As illustrated in Table 5, it was possible to identify articles that specifically focused on particular fields within education.

All articles consider various challenges in integrating generative AI into education. Therefore, the five most significant challenges were selected, Academic Integrity and Ethical Use of AI Tools, Understanding User Experiences and Impact on Critical Thinking Skills, Adapting Teaching and Learning Practices and Assessing Learning Outcomes. As illustrated in Table 6, this table showcases the distribution of articles across these four challenges in the field of generative in education.

Table 5. References for other specific educational fields identified.

Integration in Specific Educational Fields	References by ID	Total
Software Engineering Education	6	1
Pharmaceutical education	11	1
AI Chatbots in Education	17, 23	2
EFL Education	4	1
OpenAI's Codex on CS2 Programming	5	1

Table 6. References for each main challenge identified.

Main Challenges	References by ID	Total
Academic Integrity and Ethical Use of AI Tools	1, 2, 5, 6, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28	24
Understanding User Experiences and Impact on Critical Thinking Skills	1, 2, 5, 6, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28	23
Adapting Teaching and Learning Practices	5, 6, 10, 11, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28	18
Assessing Learning Outcomes	11, 13, 14, 15, 23, 24, 25, 26, 27, 28	11

2.3.2 Literature Analysis

RQ1. In what contexts can Generative AI be applied in the educational sector?

Taking into account the presented in Table 4, there are several studies that explore the 4 main topics categorized as Use of Generative AI in education, Students voice and Teaching practices, Integration of Generative AI in Specific Context and Assessment Practices and AI Literacy.

Use of Generative AI in education, explores the potential of generative AI to be used in a variety of educational settings, such as personalized learning, adaptive assessment, and creative writing. The articles included in this topic, explore branches where generative AI can be applied, namely, the potential role of generative AI in programming education scenarios (Smolansky et al., 2023) or the potential use of generative AI in software engineering education (Daun & Brings, 2023). Additionally, the topic delves into the attitudes of higher education English language instructors towards generative AI tools, emphasizes the need for tailored support and professional development programs to address challenges and concerns, (Kohnke et al., 2023). Within the same thematic framework, there is an exploration of the development of AI literacy principles for elementary students through a classroom

intervention grounded in learning theories (Relmasira et al., 2023). Furthermore, the potential benefits, with a focus on the utility of generative AI as an educational tool in statistics and data science (Ellis & Slade, 2023), also align with and contribute to this overarching topic.

Students voice and Teaching practices, includes studies that focus on the perspectives of students and teachers regarding the utilization of generative AI in education. The studies in this topic consider responses from students and teachers regarding the use of generative AI at both the level of teaching practices, learning, and educational values and philosophies. One study within this topic, conducted by Smolansky et al. (2023), employs a survey to understand how both educators and students perceive the use of generative AI in various assessment scenarios. This research sheds light on the extent of generative AI usage, consensus on impacted assessment types, and concerns related to academic integrity. The findings emphasize the importance of considering both educators' and students' perspectives in assessment reform efforts, with a focus on learning processes and critical thinking. Another study by Li et al. explores the interconnected processes of reflection and goal setting in education. This research quantifies the correlation between students' retrospective reflection and subsequent goal setting, providing valuable insights for educators aiming to foster deeper reflection, specific goal setting, and improved self-regulation (Li et al., 2023). Additionally, Mills (2023) proposes open educational practices inspired by the Open Educational Resources (OER) movement. The article advocates for leveraging online communities and collaboration spaces, providing educators with platforms to share ideas and practices related to AI. This collaborative approach encourages educators to navigate the challenges and opportunities presented by AI in teaching. Furthermore, Cook-Sather et al. (2023) delve into the perceptions of 399 university students regarding generative AI technologies, such as ChatGPT, in higher education. The survey reveals a generally positive attitude towards generative AI, acknowledging its potential benefits in personalized learning support, writing assistance, and research capabilities. These insights contribute to understanding how students perceive and embrace the integration of generative AI in their academic journey.

Integration of Generative AI in Specific Context, this topic includes studies that explore the use of generative AI in more specific educational contexts, such as a novel learning platform, RECIPE, designed for English as a Foreign Language (EFL) learners, leveraging ChatGPT for interactive conversations (Han et al., 2023). Another investigation within this theme explores the influence of generative AI, particularly ChatGPT, on semi structured decision-making during the evaluation of undergraduate dissertations. This study sheds light on the evolving role of AI in academic assessments (Greiner et al., 2023). Additionally, the topic includes research on strategies for legal educators to craft assessments that challenge generative AI, emphasizing the importance of navigating the complexities

of open-source AI technology while educating students on its real-world applications in the legal domain. This underscores the call for innovative teaching methods to adapt to the transformative impact of AI in legal education (Ajevski et al., 2023). In essence, these studies collectively contribute to a deeper understanding of how generative AI is integrated into specific educational contexts, reflecting a diverse range of applications and challenges.

AI Literacy, this topic includes studies that focus on the importance of teaching students about generative AI, including its benefits, risks, and ethical considerations. One study focusing on the perspectives of higher education English language instructors' sheds light on the challenges and opportunities in terms of AI literacy. The findings emphasize the significance of digital competencies and pedagogical knowledge required for implementing generative AI (Kohnke et al., 2023). The identified opportunities arise in cultivating positive attitudes towards integrating AI, highlighting the potential for enhancing students' learning experiences. Another study by Daun et al. (2023) explores the potential use of generative AIs, such as ChatGPT, in software engineering education. The discussion addresses challenges, including potential threats to traditional assessment methods, and emphasizes the need for guidance in utilizing generative AI. Furthermore, Chan (2023) proposes an AI education policy for higher education, examining perceptions and implications of text generative AI technologies. The study identifies challenges related to privacy, security, and accountability, as well as opportunities to enhance teaching and learning outcomes.

According to Table 5, can be observed in specific contexts that explore the use of generative AI, such as in software engineering, as discussed by Daun et al. (2023), which highlights the potential for enhancing software engineering education. Another context is also the use of AI in pharmaceutical education, where Li et al. (2023), aimed to quantify the connection between students' retrospective reflection and their subsequent goal setting, providing more in-depth insights to benefit educators in their teaching to promote deeper reflection, more specific goal setting, and better self-regulation. Another specific context mentioned previously is the use of ChatGPT for interactive conversations with a novel learning platform, RECIPE, designed for English as a Foreign Language (EFL) learners (Han et al., 2023). In other context within education is the investigation by Finnie-Ansley et al. (2023), how OpenAI Codex performs on advanced computer science (CS2) exam questions compared to students, revealing that Codex outperforms most students and examining the implications for undergraduate computing education.

AI Chatbots in Education is another branch explored in the educational context, addressed by Ilieva et al., 2023, which proposes a theoretical framework for blended learning with intelligent chatbots, utilizing generative AI to enhance educational experiences, interactivity, and course

management in universities. Additionally, Farazouli et al. (2023), delves into the impact of AI chatbots, specifically ChatGPT, on university teachers' assessment practices, revealing varying passing rates and suspicion ranges when comparing chatbot-generated and student-written texts. This study raises considerations about the disruptive potential of AI in higher education practices.

RQ.2 What are the main opportunities and challenges in the potential use of Generative AI in the educational sector?

Based on Table 6, the main challenges found in the articles were divided into: Academic Integrity and Ethical Use of AI Tools, Understanding User Experiences and Perceptions, Adapting Teaching and Learning Practices, Assessing Learning Outcomes, and Impact on Critical Thinking Skills.

Academic Integrity and Ethical Use of AI Tools, involving issues related to ensuring academic integrity and the ethical use of AI tools in education, addressing concerns about plagiarism, ethics in automated assessment, and other ethical considerations (Phung et al., 2023; Finnie-Ansley et al., 2023; Daun et al., 2023).

Understanding User Experiences and Impact on Critical Thinking Skills, challenges that include how students and teachers perceive, and interact with AI tools in education, considerations about acceptance, usability, and psychosocial impact (Finnie-Ansley et al., 2023). Being important, balancing the need to teach technical skills with the need to develop critical thinking and problem-solving skills ensures that students have the necessary skills to work with AI tools and understand their limitations (van Slyke et al., 2023). The need for responsible use of AI in education, the importance of critical thinking and context recognition, and the potential for AI to perpetuate biases and inaccuracies (Cooper, 2023).

Adapting Teaching and Learning Practices, addressing the need to adapt educational practices to effectively incorporate AI, discussing how to integrate AI technologies into the educational process in an impactful manner. The adoption of AI technologies in language teaching, including resistance to new technologies, lack of confidence, ethical concerns, and the need for professional development activities (Kohnke et al., 2023; Michel-Villarreal et al., 2023; Walczak et al., 2023). Additional academic teacher time and effort, logistics and timing of new kinds of assessments, technology access, consistency over time, functionality and usability, alignment with student preferences and expectations, effectively preparing students for new assessment formats, and institutional and departmental policies that might inhibit new assessment designs and implementations (Smolansky et al.,2023).

Assessing Learning Outcomes, evaluating the impact of AI tools on students' learning outcomes and how to measure the success and effectiveness of using AI in improving academic performance for example the potential for Generative AI to exacerbate existing inequalities in education (Sullivan et al .,2023) or concerns about job replacement, societal risks related to the value system , risks and drawbacks to society as a whole , difficulties in identifying plagiarism, over-reliance on AI hindering personal growth and development, and potential negative impacts on critical thinking and creativity (Cook-Sather & Matthews, 2023).

2.3.3. SLR Conclusions

Despite employing a rigorous methodology, the execution of a SLR comes with its own set of limitations, including selection bias, publication bias, inaccuracies in data extraction, and misclassification. To mitigate selection and publication bias a comprehensive approach was taken, utilizing various similar keywords, and exploring exclusively scientific databases. In this context, the limitations stem predominantly from potential inaccuracies in data extraction and misclassification, due to the fact that the research was carried out by a single reviewer, thereby increasing the likelihood of biased outcomes.

The integration of generative AI has been embraced across various industries, and the education sector is no exception. In this regard, 28 articles were systematically reviewed to identify diverse forms of generative AI integration in education and student decision-making processes. Numerous challenges were uncovered, primarily related to adapting to this new technology and ensuring ethical AI use. Several opportunities were also highlighted, such as the application of AI in language learning, software engineering, among other fields.

This research concludes that artificial intelligence remains a realm with much to discover and explore. Undoubtedly, artificial intelligence will be an asset in the future of education. Thus, the adaptation of Generative AI in the education sector is still in the exploration and discovery phase.

Additionally, there is a notable research opportunity in exploring the adaptation of generative AI in student decision-making, as no studies specifically addressing this topic were found. This presents a promising avenue for further research.

CHAPTER 3

Research Methodology

A DSR, which stands for Design Science Research, was employed in this study. The DSR consists of creating and evaluating innovative artifacts to address and solve real-world problems. Accordingly, this method will be applied to design, construct, and assess (K. Peffers et al., 2007) a Decision Support System for Students with the integration of generative AI.

The artifact is based on the integrating Generative Artificial Intelligence (Generative AI) to elevate decision-making processes and empower students in their academic and career choices. The artifact, designed for creation and presentation to stakeholders (a group of students' volunteers and faculty professors' volunteers), will subsequently undergo testing. Following this, an evaluation based on the results obtained will take place, facilitating adjustments and improvements based on feedback. The final phase entails documenting the evolution of this process, and the outcomes achieved through the development of this artifact.

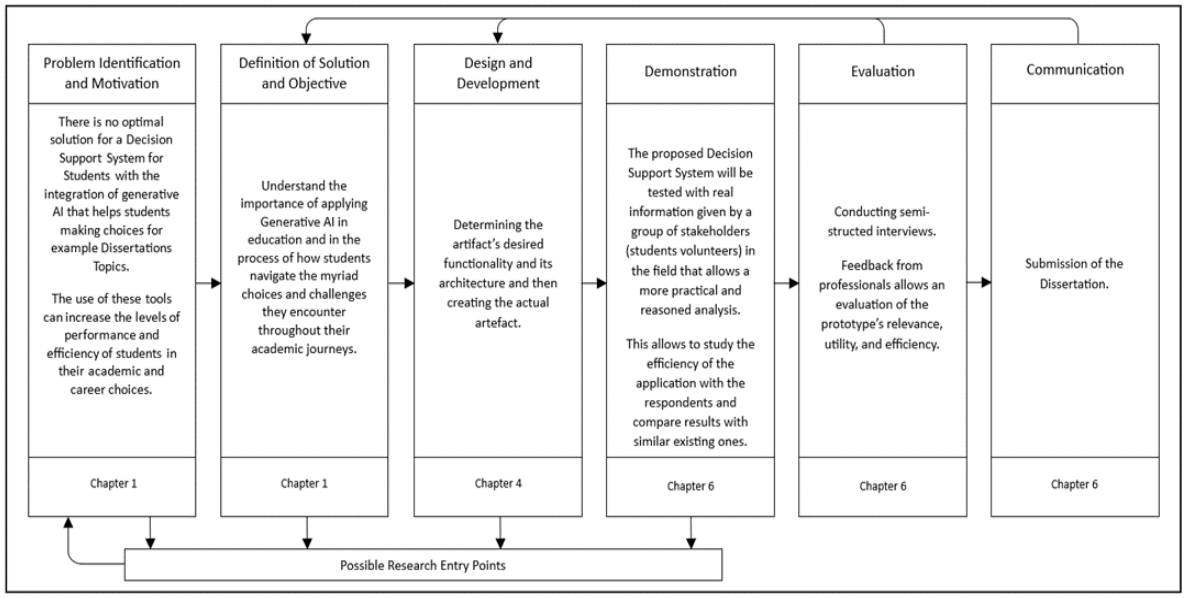


Figure 5. Application of DSR Methodology

CHAPTER 4

Proposal and Evaluation

In this phase of the DSR model, intensive research was conducted to design a suitable and adaptable artifact for all students and professors within the educational sector. This involved a systematic investigation into the needs, preferences, and challenges faced by stakeholders, to select the most suitable requirements and functionalities for development. A series of questions were asked to understand the frustrations and needs to be encountered in the decision-making process by both students and professors. Interviews were chosen as the method because they make it easier to gather diverse opinions and suggestions, given their abstract nature with no predefined parameters. The interview guide for this process can be found in Appendix B. The same interviewers were later utilized to gather feedback on the artifact in the future.

To ensure a representative sample, 11 professors were selected from diverse academic backgrounds and levels of experience as demonstrated on Table 7.

Table 7. Information of the Professor's sample.

ID	Gender	Age	Area	Institution
1	Male	48	Management	ISCTE-IUL
2	Female	55	Public Management	ISCTE-IUL
3	Male	44	Strategy	ISCTE-IUL
4	Female	37	Operations and Logistics	University Lusófona
5	Male	55	Computer Science	University of Porto
6	Male	57	Informatic Systems	IST
7	Male	54	Information Technologies	University Lusófona and ISCTE-IUL
8	Male	38	Information Technologies	ISCTE-IUL
9	Female	48	Marketing Management	ISCTE-IUL
10	Male	30	Information Technologies	ISCTE-IUL
11	Male	52	Information Technologies	ISCTE-IUL

For students, we focused on a specific segment, selecting 12 master's degree students from different areas and institutions (Table 8.). During the interviews, open-ended questions were employed to encourage respondents to freely express their thoughts and provide detailed feedback on their experiences and challenges during their academic journey. The set of questions can be found in Appendix B.

Following the data collection phase, rigorous analysis techniques such as thematic analysis were employed to identify common themes, patterns, and key issues emerging from the interviews. These findings were then taken into consideration for the design and development of the artifact, ensuring it effectively addressed the identified needs and concerns of both master's students and supervisors.

Table 8. Information of the student's sample.

ID	Gender	Age	Area	Institution
1	Male	24	Computer Science	FEUP
2	Male	21	Geography	IGOT
3	Male	22	Strategy	ISCTE-IUL
4	Female	22	Computer Science and Engineering	University of Minho
5	Female	22	Data Science	ISCTE-IUL
6	Female	22	Computer Science and Business Management	ISCTE-IUL
7	Female	22	Computer Science and Business Management	ISCTE-IUL
8	Female	21	Computer Science and Business Management	ISCTE-IUL
9	Male	22	Architecture	University of Malaga
10	Male	23	Computer Science and Business Management	ISCTE-IUL
11	Male	23	Computer Science and Business Management	ISCTE-IUL
12	Female	22	Computer Science and Business Management	ISCTE-IUL

We observed that due to the focus on master's students, the decision-making process in choosing master's thesis themes emerged as a frequently raised thesis theme. This concern was also noted multiple times within the sample of faculty members. After a brief discussion with each of the interviewees, in Figure 6 the following concerns were identified.

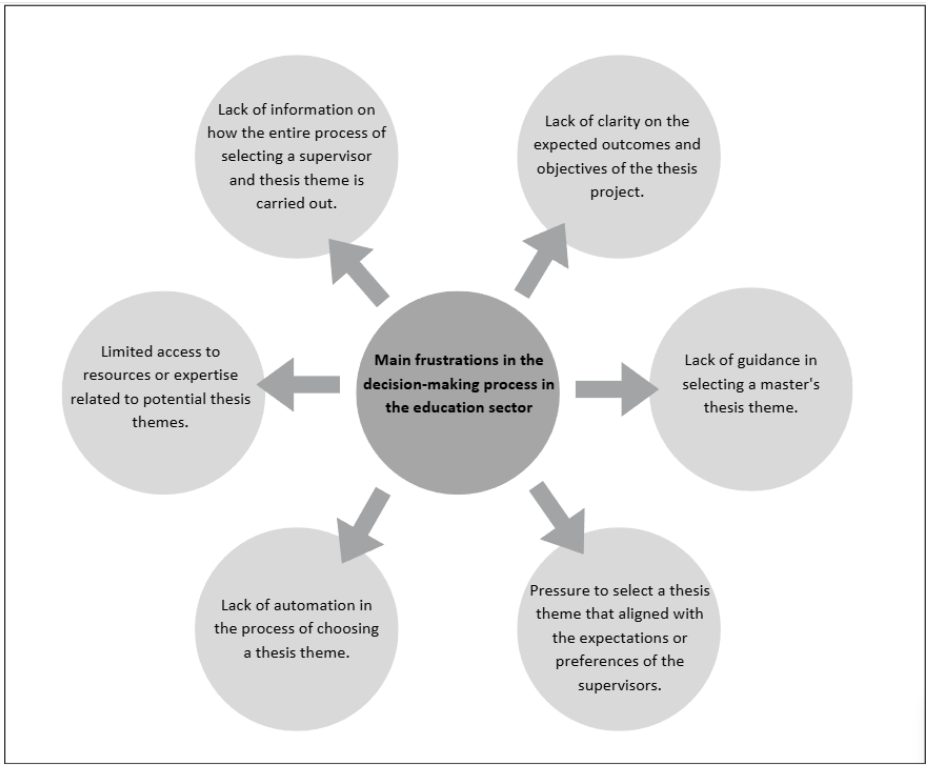


Figure 6. Concerns identified on the decision-making process in the education sector

The results of the interviews helped to construct and define the purpose of this product. A platform that creates an interaction between supervisors and students to support the selection of a master's thesis theme.

4.1 First DSR Iteration

To develop the initial iteration of the DSR, the same group of interviewees, mentioned in Table 7 and Table 8, were considered, to build the first artifact. A set of different functionalities and requirements were gathered through the interviews, as outlined in Appendix C.

4.1.1. Requirements Gathering

Before building a list of requirements, given the opinions of the interviewees, it was possible to understand that two types of users are needed in this product. One for students and another for professors-supervisors. Thus, the following features on Table 9 were made available for both type of users.

Table 9. Features gathered.

ID	Feature	Feature Description
F.1	Universities	This feature displays a list of all universities, when one is clicked redirects to the feature F2.
F.2	Schools	This feature displays all the schools available within a specific university, when clicked redirects to the feature F5.
F.3	Log in	This feature allows users to access their private account.
F.4	Sign in	This feature allows users to create a *student* account or a *professor* account depending on the type of user wished.
F.5	Master's Programs	This feature displays all the master's available within a specific school in a university, when clicked redirects to the feature F6.
F.6	Thesis	This feature displays all thesis available for applications, within a specific master's program in a specific school of a specific university. If the user is logged in, there is a favorite button that saves the thesis theme on their profile.
F.7	Detail Thesis	This feature displays all the relevant information of a specific thesis theme (title, supervisor, co-supervisor, framework; activities, objectives, expected result, requirements, and observations).
F.8	User Student Profile	This feature is accessible only for the type of user student. It displays academic information (name, university, master´s program, LinkedIn link and curriculum), and a list of favorite themes.
F.8.1	Apply Thesis	This feature is accessible only for the type of user student and can be consulted by all types of users. It is accessed by a button on the Detail Thesis Page, that allows the user student to apply to a specific thesis, being the outcome sending an email to the professor supervisor owner of the thesis that is being applied.
F.8.2	Generate Ideal Proposal	This feature is accessible only for the type of user student. This feature suggests the best proposal themes available to the user preferences.
F.9	User Professor Profile	This feature is accessible only for the type of user professor and can be consulted by all types of users. It displays academic information (name, university, background, and LinkedIn link), and a list the thesis themes created by the user.
F.9.1	Create Thesis Theme	This feature is accessible only for the type of user professor. This feature creates an object thesis theme, a set of inputs (title, supervisor, co-supervisor, framework, activities, objectives, expected result, requirements, and observations) are required to create this object.
F.9.2	Generate Thesis Theme	This feature is accessible only for the type of user professor. This feature suggests ideas of thesis themes, considering three key words.
F.9.3	Edit Thesis Theme	This feature is accessible only for the type of user professor. Allows the user owner of an object thesis theme to edit and alter the inputs of the object.
F.10	Edit Profile	This feature allows users to edit their password and other information, depending on the type of user.

4.1.2. Mockup

To gain a better perspective of what will be developed and who is the end user for each feature, a Use Case Diagram was created (Figure 7). This diagram was subject to changes throughout the development process of this artifact.

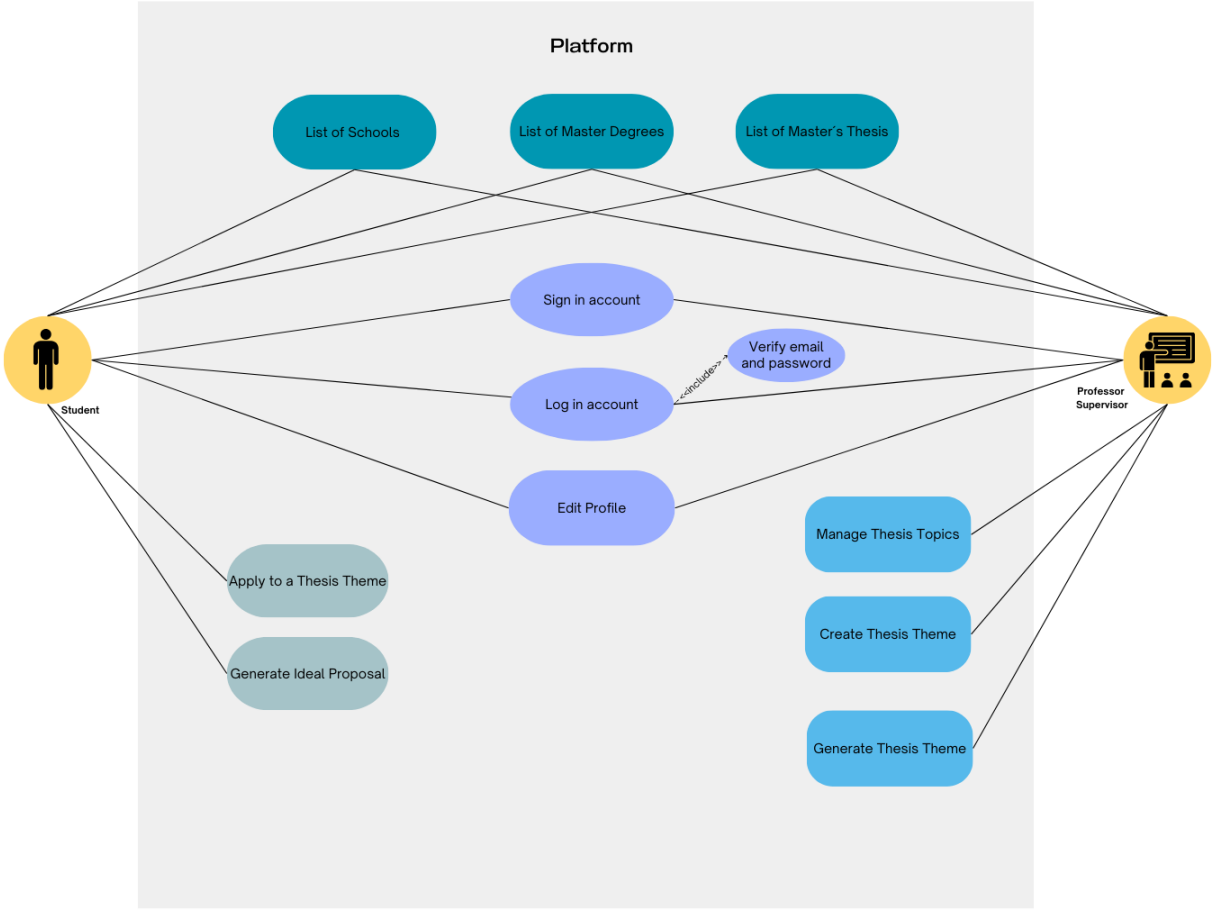


Figure 7. Diagram Use Case

4.1.3. Artifact Development

After gathering the set of features and building the initial mockup view for the artifact, the database and program to be used for developing this product were decided. Bubble.io was chosen. This low-code platform allows for the integration of various functionalities, including databases, APIs, and user authentication, among others. The use of this platform is free and can be upgraded with a paid subscription for additional features and enhanced capabilities.

Bubble.io provides a comprehensive environment for building web applications without requiring extensive coding knowledge. It supports drag-and-drop elements, workflows for automating tasks, and

plugins to extend functionality. This makes it an ideal choice for quickly prototyping and iterating on the application.

It was also decided to integrate AI through an Application Programming Interface (API). An API allows different software systems to communicate with each other. The use of an AI API enables the application to leverage advanced machine learning models and algorithms to provide intelligent features and functionalities, such as natural language processing, image recognition, or predictive analytics (Robbin, 2023). Specifically, the API will be used to create a connection with ChatGPT to collaborate on the feature for managing thesis topics and enhancing the ability to generate ideas.

Additionally, to provide visible examples, the platform was populated with sample thesis topics proposed in previous years and profiles representing some ISCTE professors.

Seven iterations were planned for the development process: four focusing on the student perspective and three on the teacher perspective. These iterations were divided as shown in Table 10 below.

Table 10. Features gathered

DSR Iteration	Feature ID	Type of Interviewee
First Iteration	F.1; F.2; F.3; F.4; F.5; F.6; F.7	Professor-Supervisor
Second Iteration	F.1; F.2; F.3; F.4; F.5; F.6; F.7	Student
Third Iteration	F.1; F.2; F.3; F.4; F.5; F.9; F.9.1; F.9.2; F.9.3; F.10	Professor-Supervisor
Fourth Iteration	F.1; F.2; F.3; F.4; F.5; F.9; F.9.1; F.9.2; F.9.3; F.10	Professor-Supervisor
Fifth Iteration	F.1; F.2; F.3; F.4; F.5; F.8; F.8.1; F8.2 F.10	Student
Sixth Iteration	F.1; F.2; F.3; F.4; F.5; F.8; F.8.1; F8.2 F.10	Student
Seventh Iteration	F.1; F.2; F.3; F.4; F.5; F.8; F.8.1; F8.2 F.10	Student

4.1.4 Demonstration

After developing the features in the first phase, a follow-up interview was conducted with a supervisor from Table 7 to gather feedback on the platform's performance and usability. The goal of these

interviews was to evaluate the effectiveness of the implemented features and identify areas for improvement. To showcase the initial artifact, various pages were developed to represent the functionalities implemented in this iteration. The pages shown in Figures 8 to 14 represent the common features for both types of users: professors and students.

When the interviewee accessed the platform, they could browse through the various universities available on the platform. After selecting one, they were redirected to that university's specific page, which listed its different schools. For example, the interviewee chose ISCTE and then navigated to the School of Technologies and Architecture. They were then redirected to a page showing all the master's programs available within that school and selected the Data Science course. Upon selecting the course, the interviewee was taken to a page displaying the different thesis themes available for that program. When a topic is selected, it redirects to a page presenting all its details.

The interviewee was also able to view the login and account creation screens, which can be accessed at any time after selecting a university.

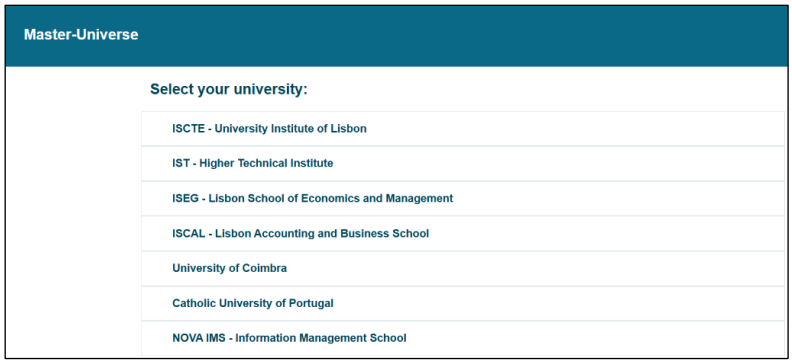


Figure 8. Feature F.1

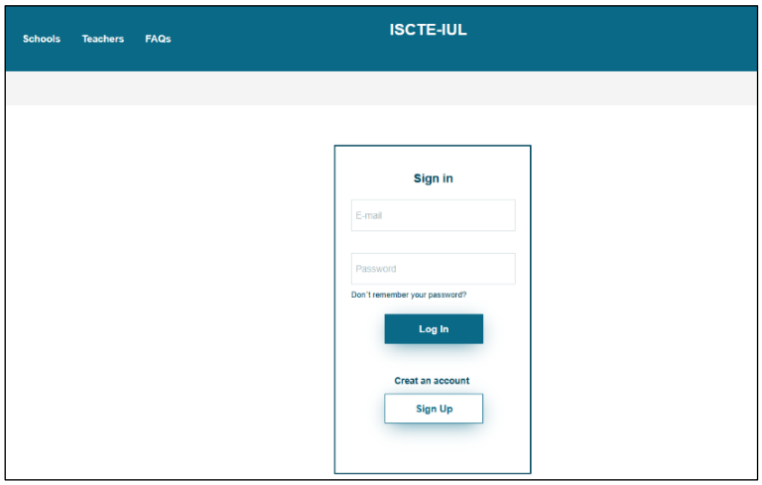


Figure 9. Feature F.2

Figure 10. Feature F.3

Figure 11. Feature F.4

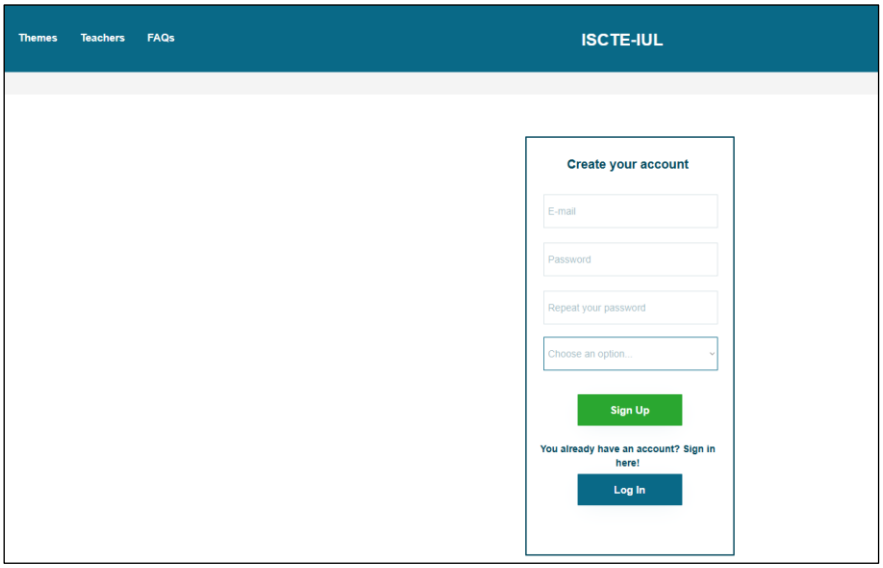


Figure 12. Feature F.5

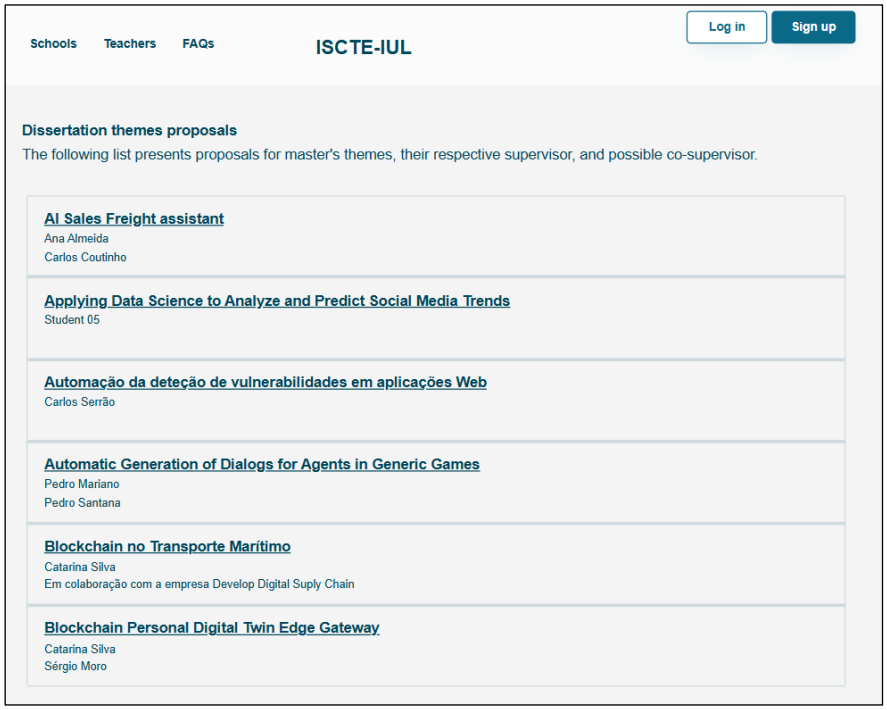


Figure 13. Feature F.6

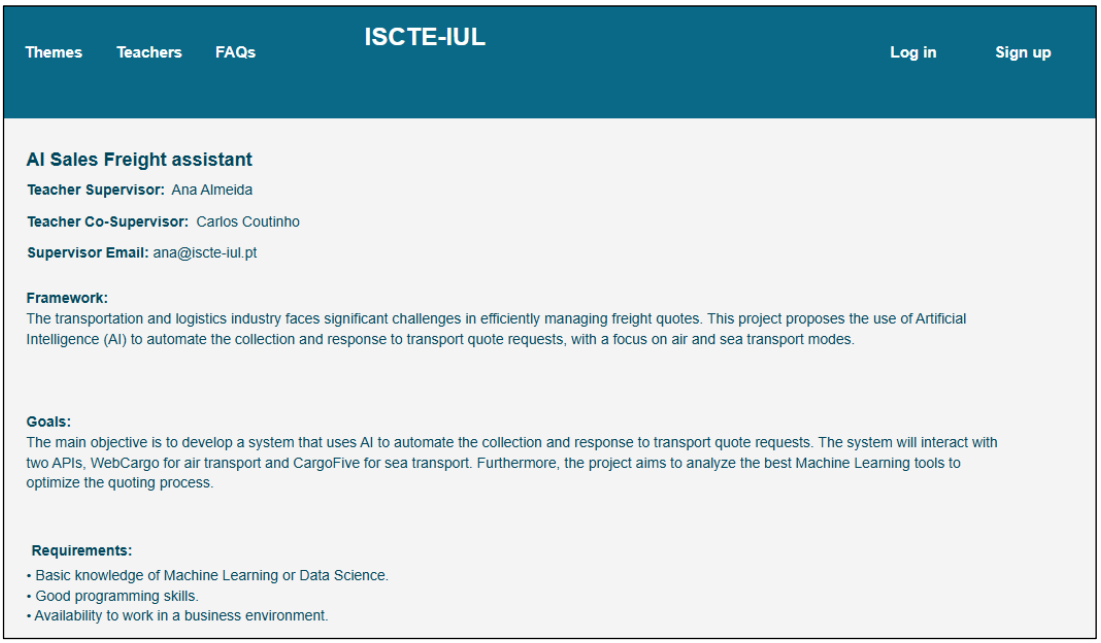


Figure 14. Feature F.7

4.1.5. Evaluation

After the interviewee navigated and explored the various pages developed, questions were to gather comprehensive feedback. The questions asked during the interviews, as shown in Table 11, aimed to capture both positive and negative aspects of the platform, as well as any suggestions for enhancements. Question 1 aimed to identify which features or functionalities of the platform were well-received and effective in addressing the needs of the users. Question 2 sought to uncover any shortcomings, challenges, or issues encountered while using the platform. Question 3 was designed to gather constructive feedback and ideas for future iterations, focusing on how the platform could be enhanced to better meet user needs.

The interview was conducted via a virtual meeting with screen sharing, allowing the user to perform operations directly on the platform.

Table 11. Evaluation Questions

Questions
Q1. What are the positive aspects of the proposed platform?
Q2. What are the negative aspects of the proposed platform?
Q3. What are the suggestions/improvements you pretend to make towards the proposed platform?

The tables below summarize the positive aspects, negative aspects, and suggested improvements based on the feedback and experiences of these volunteers. The insights gathered from this interview will be instrumental in guiding the next phase of development, ensuring the platform meets the needs and expectations of its users.

Following the initial interview about the artifact, it was noted that the navigation feature is both effective and intuitive, allowing users to quickly and easily search for programs and courses. Additionally, the detail provided on thesis topics was appreciated for being very useful and clear, offering all the necessary information to evaluate options.

However, one limitation was identified: the lack of robust search filters made it challenging to find specific courses or thesis topics. To address this issue, two improvements were suggested. First, adding a "favourite" button to save thesis topics would allow users to easily return to their preferred options without needing to repeat their searches. Second, implementing additional search filters would

enhance the platform's functionality, enabling users to narrow down their search results more effectively and find specific universities or thesis topics with greater ease.

This feedback is summarized in Table 12, which includes two pros, one con, and two suggested improvements.

Table 12. Interview with Supervisors ID 3

	ID	Professor Supervisor Synthesis	Professor Supervisor Opinion
Pros	P.1	"The navigation is effective and intuitive."	The navigation feature between universities and schools was particularly effective. The interface is intuitive, allowing for quick and easy searches for programs and courses.
	P.2	"The thesis theme page detail is very useful and clear."	The feature that displays the details of thesis topics is excellent. When selected a thesis theme, the page that opened provided all the necessary information in a clear and detailed manner, which is crucial for evaluating available options.
Cons	C.1	"There is a lack of search filters."	I struggled to find specific courses or thesis topics due to the limitations of the available filters.
Improvements	I.1	"Add a favorite button to save the thesis themes."	Adding an option for users to save their searches and favorites would be a valuable feature. This would allow users to easily return to their previous selections and track their preferences without needing to repeat the search process.
	I.2	"Add search filters."	Implementing additional search filters would enhance the platform's functionality. More robust filters would help users narrow down their search results more effectively, making it easier to find specific universities or thesis topics that match their criteria.

4.2. Second DSR Iteration

Gathering information from the first interviewee was crucial for the development of this second iteration. After analysing the interview, the second prototype of the artifact was developed and evaluated, with the suggestions made by the interviewee, displayed in Table 12, being taken into consideration.

4.2.1. Proposal

In this second iteration, the features were improved to allow the platform to be reviewed by another interviewer to gather new inputs and feedback. Table 13 provides a summary of the improvements made. At this stage, all proposed improvements have been implemented.

Table 13. Improvements after the First Iteration

Improvement	ID	Type of Improvement	Implemented	Suggested by
"Add a favorite button to save the thesis themes."	I.1	Button	Yes	Interviewee Professor Supervisor
“Add search filters.”	I.2	Filters	Yes	Interviewee Professor Supervisor

Figure 15 illustrate the progress made based on the suggested improvements. A "favourite" button has been added to the thesis topics listing, allowing users to save their preferred topics directly to their profile for easy access later. Additionally, new search filters have been incorporated to refine and enhance the search process, enabling users to narrow down their search results more effectively and find specific thesis themes by name or by teacher supervisors with greater precision.

4.2.2. Demonstration

In this second phase, the same features demonstrated in the first iteration were presented to a student from Table 8. This was done to obtain a new perspective on the feedback regarding the common features for both types of users, along with the changes made from Table 13.

The interviewee had the opportunity to explore features 1 through 7. They accessed the platform, navigated through various universities, selected one, explored its schools, chose a master's program, and then browsed through the different master's thesis themes. Finally, after finding themes of

interest, they decided to create an account, logged in, and saved the thesis themes they were interested in to their favourites, as shown in Figure 15.

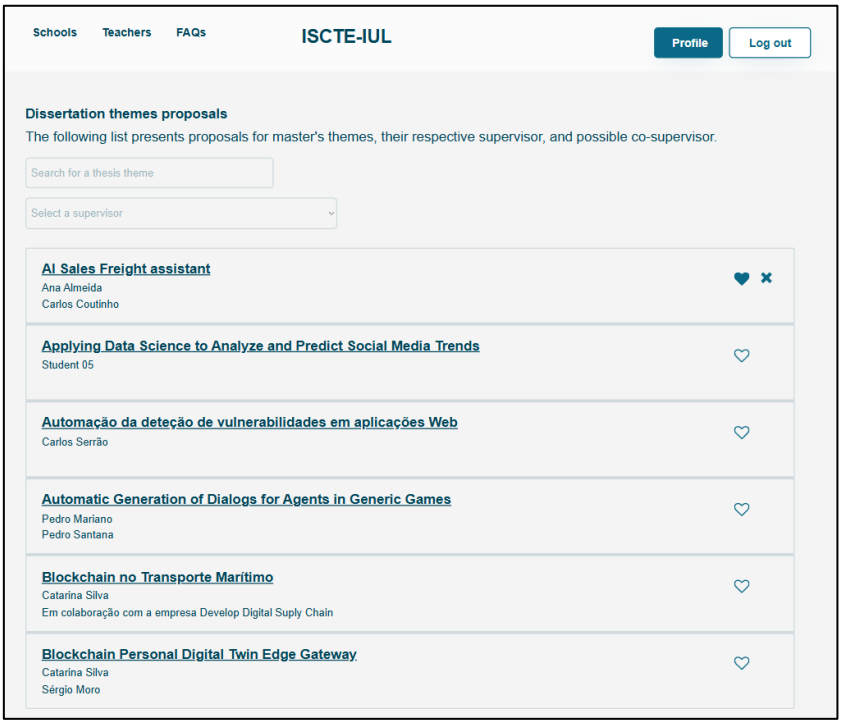


Figure 15. Feature F.6

4.2.3. Evaluation

After the second interview conducted with a student, we were able to collect one positive points, one negative point, and two suggestions for improvement, as detailed in Table 14. This iteration received similarly positive feedback to the first interaction. The positive points highlighted the platform's intuitive navigation and the comprehensive range of available thesis topics. The negative point focused on occasional slow loading times. The suggestions for improvement included enhancing the search functionality to allow for more refined filtering options and integrating a feature to directly contact potential thesis advisors. Overall, the feedback reaffirmed the platform's value while providing actionable insights for further enhancement.

Table 14. Interview with Student ID 6

	ID	Student Synthesis	Student Opinion
Pros	P.3	"User-friendly interface."	The platform boasts intuitive navigation, along with a clear and organized layout, making it easy for users to find and access the information they need.
Cons	C.2	"Occasional slow loading times"	During the navigation, it was noticed that there were occasional delays in loading times, which appeared to impact the overall user experience and efficiency of the platform.
Improvements	I.3	"Improve platform performance speed."	Optimize the platform's navigation to ensure a smoother and more efficient experience by reducing loading times and facilitating quick access to key features and information.
	I.4	"Integrate a feature to create contact with potential thesis professors' supervisors."	Create communication between supervisors and students by integrating a feature that allows direct contact with potential thesis advisors, facilitating effective collaboration from the start of the process.

4.3. Third DSR Iteration

For this iteration, a new set of features was introduced and evaluated. We selected a different teacher supervisor from Table 7 for the interview.

4.3.1. Proposal

In the third iteration, only one improvement was implemented: the development of a feature that connects students to faculty supervisors, as originally planned, through Feature F.8.1, which will be detailed later. Regarding Improvement 3, it has not yet been implemented, as issues related to speed and performance can only be addressed once the platform is fully operational.

Table 15. Improvements after the Second Iteration

Improvement	ID	Type of Improvement	Implemented	Suggested by
"Improve platform performance speed."	I.3	Optimization	No	Interview Student
"Integrate a feature to create contact with potential thesis professors' supervisors."	I.4	Feature	Yes	Interview Student

4.3.2. Demonstration

After the improvements implemented over these two iterations, the initial proposal for a new set of features was also finalized. These features are categorized by user type. In this interview with the supervisor professor user, the features F.9 (F.9.1, F.9.2, F.9.3, F.9.4) were presented, along with the feature common to both user types, F.10, as demonstrated in Figure 18.

Upon accessing the platform, the user began by editing their profile, adding information such as their university, course of study, and a profile picture. Next, they decided to explore available thesis topics to gather ideas, browsing through theses published by other professors and saving some to their favourites. Subsequently, the user accessed their profile where they could find the thesis they had saved.

The interviewee then selected the "Theme Proposals" section and chose the option to create a new thesis topic, which redirected them to the thesis creation page. After filling in the necessary details, the user saved the thesis topic and was able to view it on their profile, where they also experimented with the editing section.

Subsequently, the user explored the thesis topic generation feature, which provided a range of ideas based on the input of interest areas and keywords. Finally, the user navigated back to the profile section, where they chose to edit their profile by adding a profile picture and some additional information.

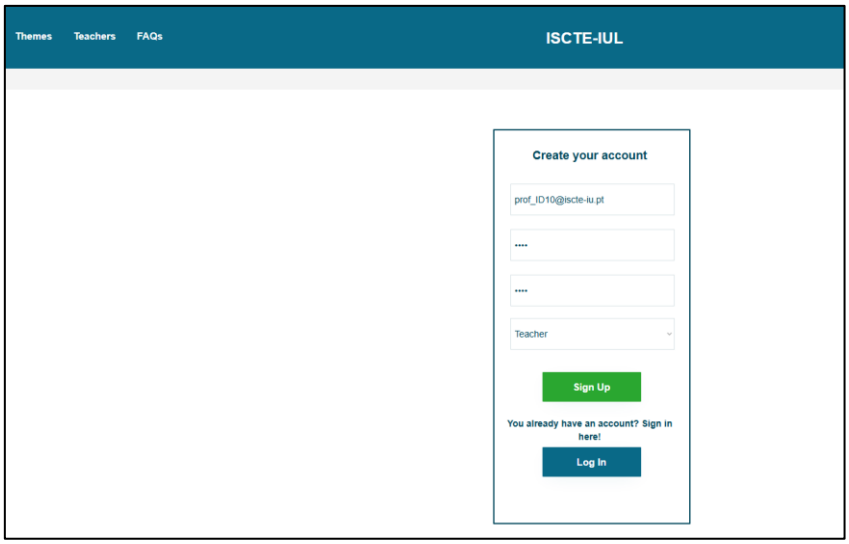


Figure 16. Feature F.4

Figure 17. Feature F.9

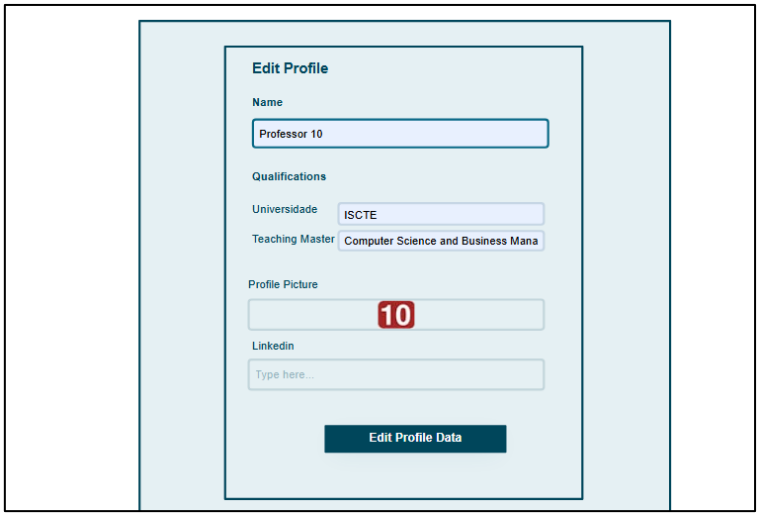


Figure 18. Feature F.10

Figure 19. Feature F.6

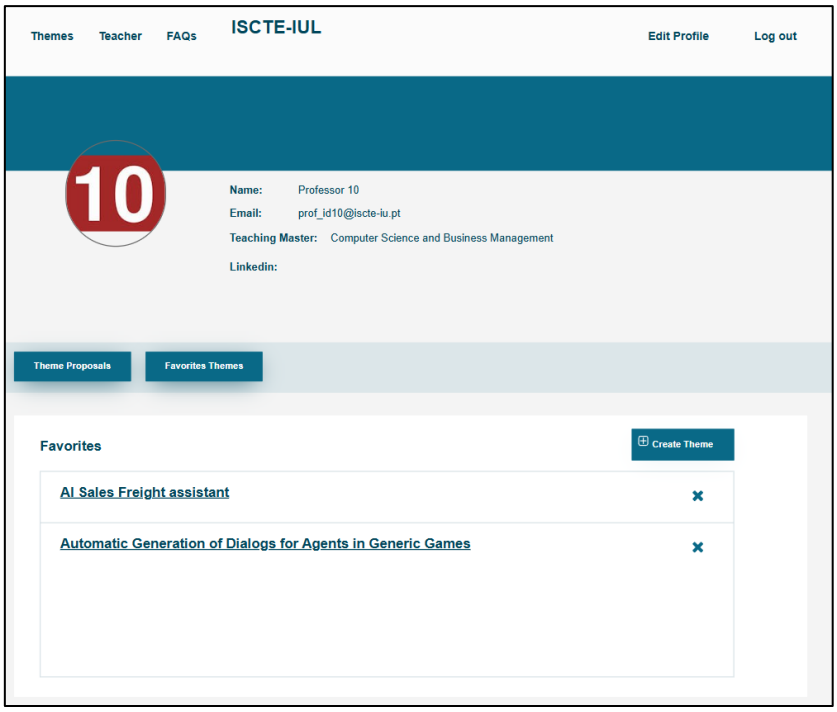
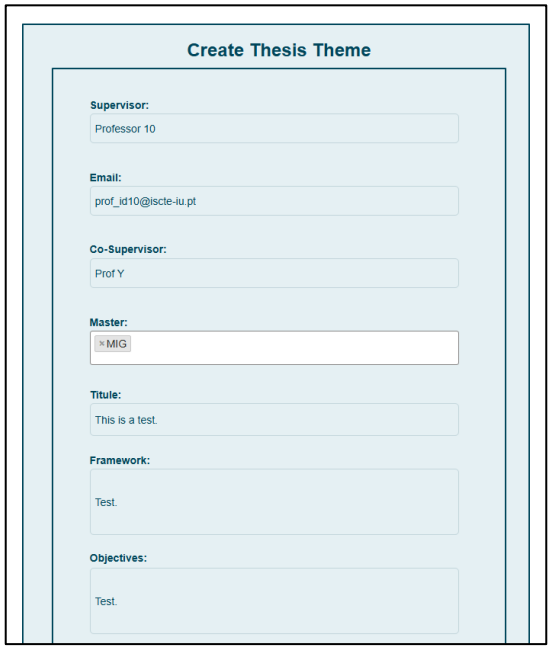


Figure 20. Feature F.9



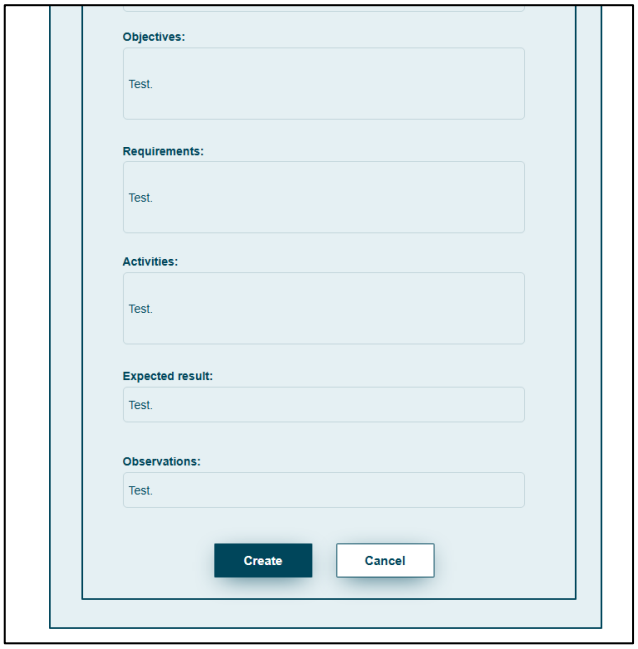


Figure 21 and 22. Feature F.9.1

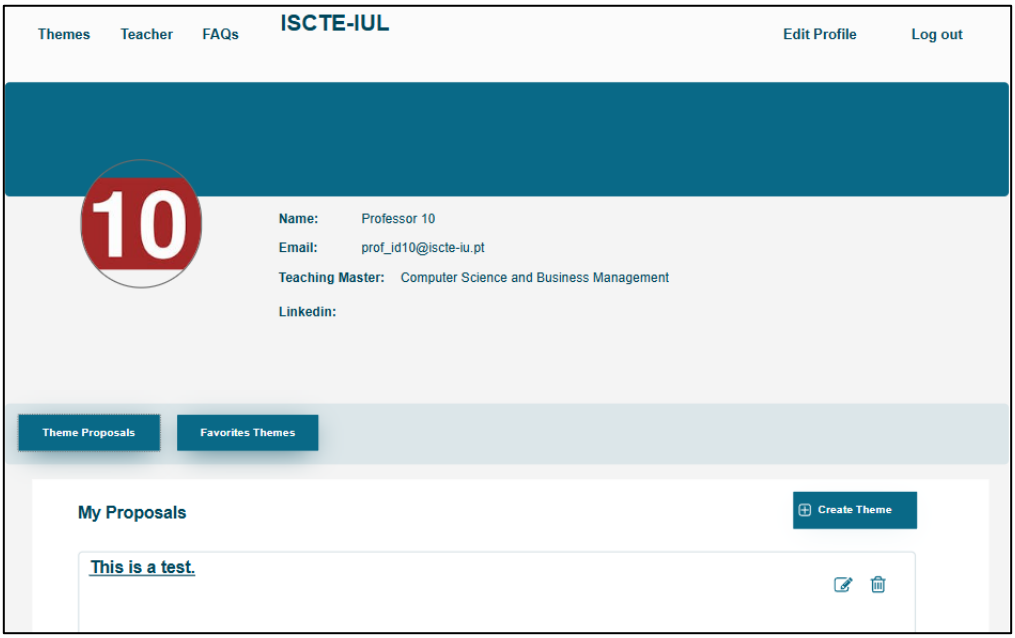


Figure 23. Feature F.9

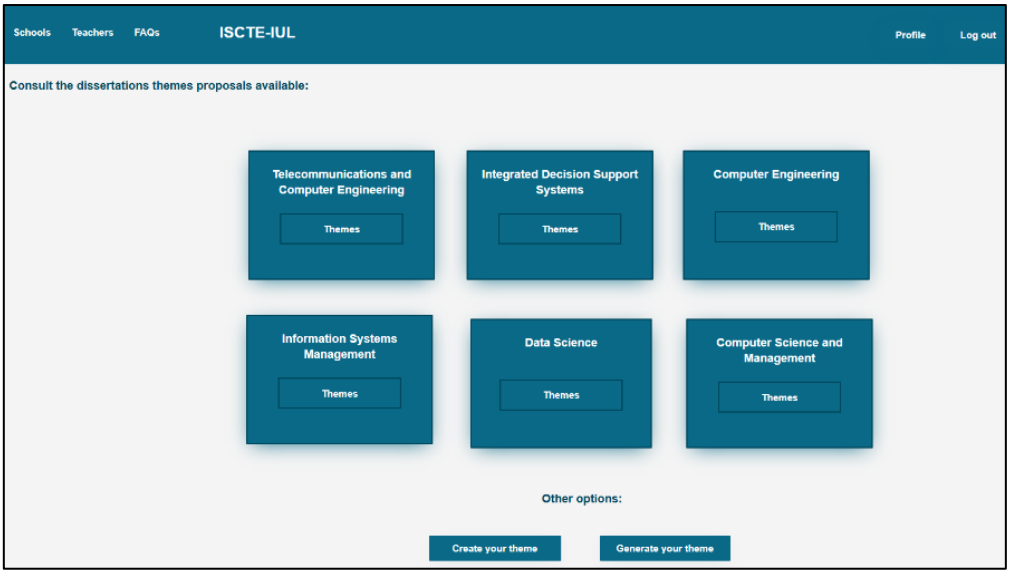


Figure 24. Feature F.4

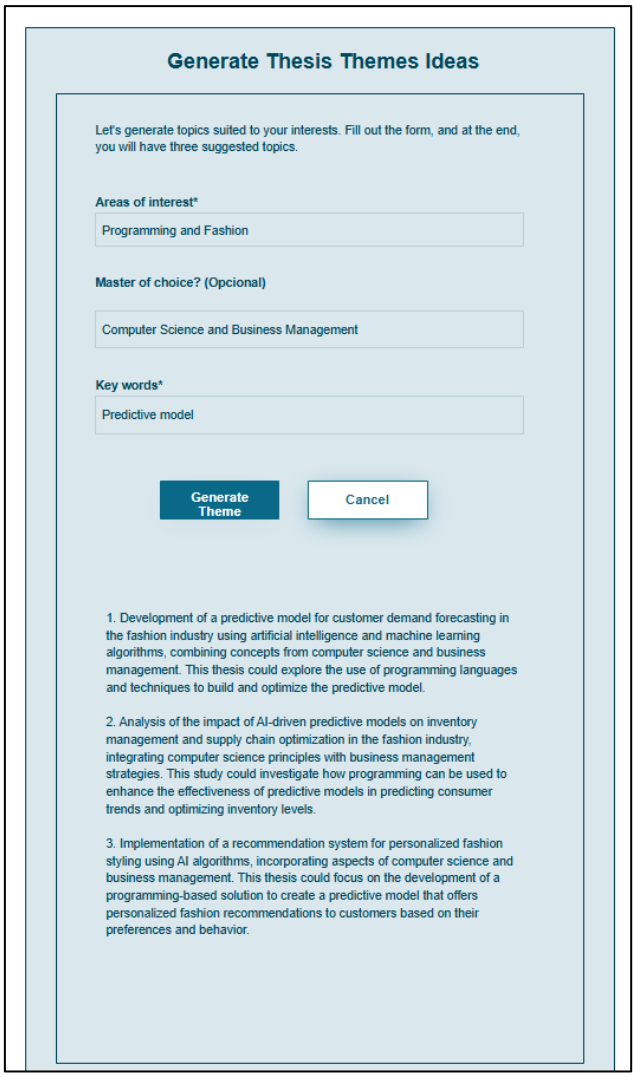


Figure 25. Feature F.9.2

4.3.3. Evaluation

After navigating through both the previously evaluated features and the newly implemented ones, three positive points, four negative points, and three opportunities for improvement were identified, as detailed in Table 16. The positive feedback primarily highlighted the platform's creativity and usability. However, the negative feedback pointed out issues such as the inability to save created theses without immediate publication, a lack of optimization in the thesis creation process, and insufficient interaction on the topic generation page, which also failed to save user inputs.

The suggestions for improvement focus mainly on optimizing the thesis creation and topic generation pages, as well as adding a button to save proposed theses without publishing them to other users. By addressing these issues, we aim to improve the user experience and functionality of the platform, making it more efficient and user-friendly.

Table 16. Interviews with Supervisors ID 10

	ID	Professor Supervisor Synthesis	Professor Supervisor Opinion
Pros	P.4	"The profile page is very creative and interactive."	The profile page is highly intuitive and easy to use, facilitating the thesis proposal process and storage management.
	P.5	"The create thesis theme is very useful and well achieved."	The create thesis theme page includes all necessary requirements for building a proposal, ensuring comprehensive coverage.
	P.6	"The generative AI page is very promising."	The generative AI page introduces innovative features not previously available, marking a promising area for further development.
Cons	C.3	"It was not possible to store a thesis theme proposal without publishing it."	The profile page lacks an option to save thesis themes without publishing them, posing a usability challenge.
	C.4	"The generative AI page is not interactive and does not save its inputs."	The generative AI page lacks interactivity and fails to save inputs, hindering user interaction and usability.
	C.5	"There is a lot of information to fill in when creating a thesis theme."	Creating a thesis theme requires extensive input, consuming significant time and effort.
Improvements	I.5	“Make the thesis themes visible/invisible for other users.”	Implement a visibility button to toggle thesis theme visibility for other users.
	I.6	"Optimize the process of creating thesis themes and facilitate the process."	Streamline and automate the thesis theme creation process to reduce complexity and enhance user experience.
	I.7	"Optimize and improve the generative AI page."	Improve the generative AI page to provide richer suggestions and ensure the ability to save generated themes.

4.4. Fourth DSR Iteration

Collecting insights from the interviewees was crucial for the advancement of this fourth iteration. After thoroughly analysing the interview data, the suggested improvements from Table 16 were incorporated into the fourth prototype.

4.4.1. Proposal

In this fourth iteration, the features were improved to allow the platform to be reviewed by another interviewer to gather new inputs and feedback. Table 17 provides a summary of the improvements made. At this stage, all proposed improvements have been implemented, except the I.3.

Table 17. Improvements after the Third Iteration

Improvement	ID	Type of Improvement	Implemented	Suggested by
“Make the thesis themes visible/invisible for other users.”	I.5	Button	Yes	Interviewee Professor Supervisor
"Optimize the process of creating thesis themes and facilitate the process."	I.6	Optimization page “create thesis theme”	Yes	Interviewee Professor Supervisor
"Optimize and improve the generative AI page."	I.7	Optimization page “generate thesis theme”	Yes	Interviewee Professor Supervisor

Taking into consideration the issues regarding the inability to archive a thesis theme, a button was created that allows supervisors to make their thesis theme visible or invisible to other users, storing them in any case situation. This completely addresses the issue presented regarding this aspect. Another feature added is a visibility button, allowing the supervisor to control the visibility of the thesis theme for other users.

To address the issues of the time-consuming process of filling out requirements and the inability to save AI-generated proposals, it was decided to merge the "generate theme" and "create theme" pages into a single "create theme" page (Feature F.9.1 and F.9.2), with artificial intelligence incorporated into this feature. As a result, the proposed use case diagram has undergone a slight modification with this merging decision, as shown in Figure 26.

Important issues regarding some features were raised, such as the inability to archive a thesis theme, the time-consuming process of filling out requirements, and the inability to save AI-generated proposals. To address these issues, we decided to merge the "generate theme" and "create theme" pages into a single "create theme" page. Users can access this page from their profile by clicking the "Create Thesis Theme" button.

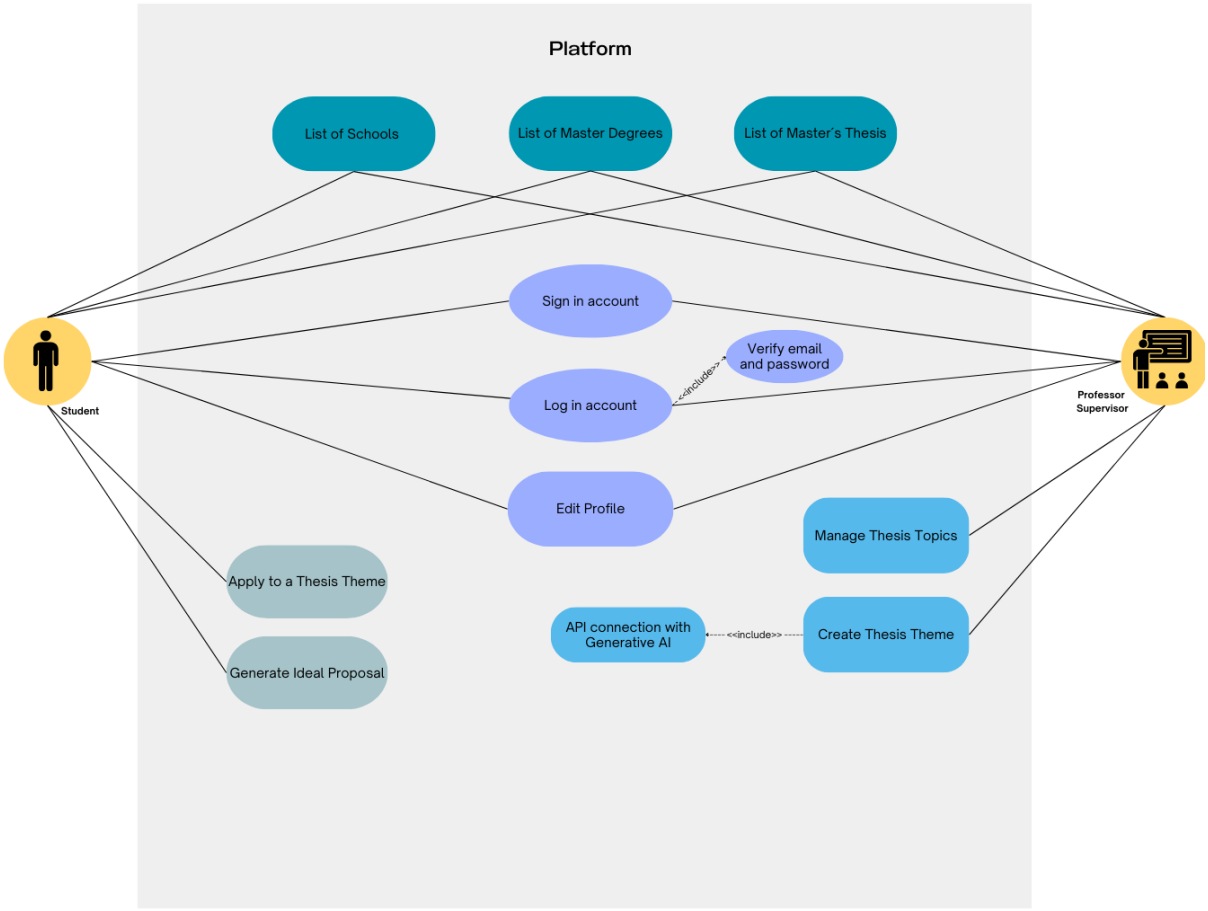


Figure 26. Diagram Use Case (version 2)

Upon entering the page, users will find various fields to fill out. To generate a thesis theme title with artificial intelligence, users need to fill in the "keywords" field and click the "generate" button next to the title input. This will produce a title with the help of AI. Throughout the process of filling out all the requirements, the supervisor can click the "generate" button next to each respective requirement to receive AI-generated suggestions, thereby streamlining the process with pertinent suggestions. If the supervisor is not satisfied with the suggestion, they can always modify the information in the input field, adjusting and adapting the thesis theme as needed.

Once satisfied with the result, the supervisor clicks the "save" button and is redirected back to their profile, where the theme is displayed and added to the associated master's program lists.

This optimization of the theme creation and generation process, aided by artificial intelligence, significantly reduces the time spent on creating thesis themes**.**

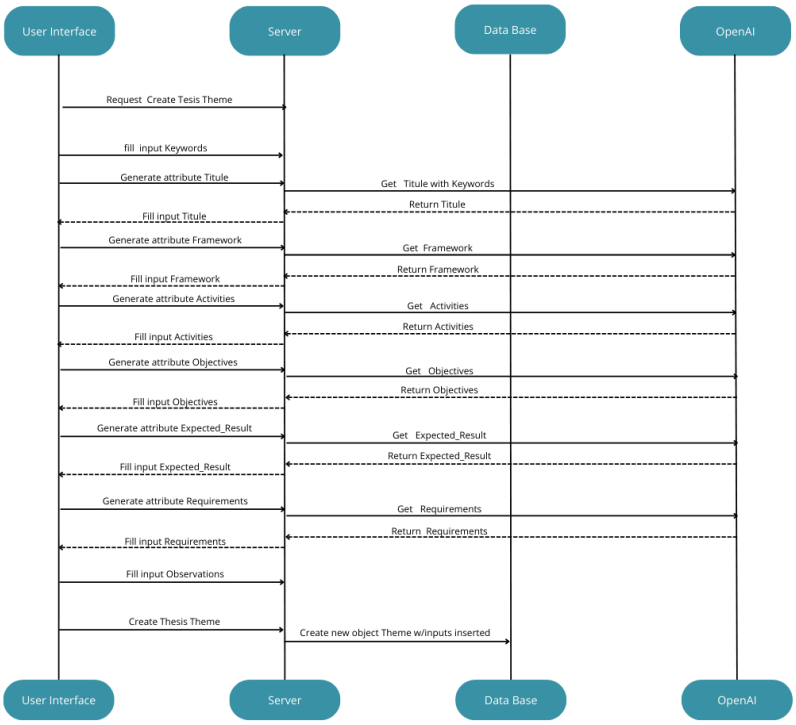


Figure 27. Flux Diagram "Create Theme"

4.4.2. Demonstration

In this fourth iteration, the interviewee accessed the platform and updated their profile. Following this, they proceeded to create a thesis topic. They chose to use AI assistance to suggest a title for the thesis by filling in the "Keywords" field and generating the observed Title. Subsequently, they decided to generate other fields such as Framework, Activities, and Objectives as seen in Figure 28. The user manually entered the remaining fields. Finally, the user when redirected to their profile, set the thesis topic to visible, making it accessible to all users, as shown in Figure 29.

Figure 28. Combined Feature F.9.1 and F.9.2

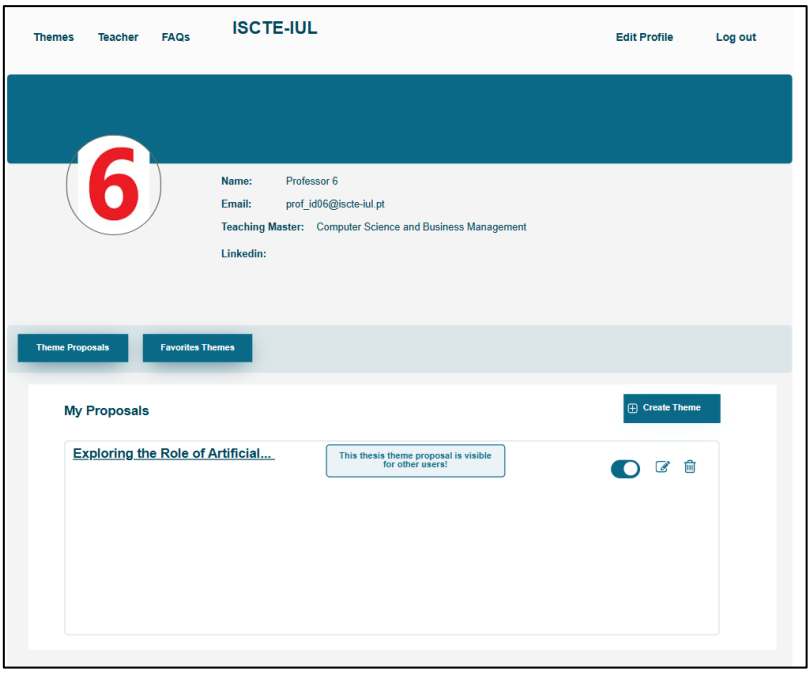


Figure 29. Feature F.9

4.4.3. Evaluation

The following tables summarize the positive aspects, negative aspects, and suggested improvements based on feedback from volunteers during the fourth iteration. This iteration played a fundamental role in refining the platform by highlighting both its strengths and areas for improvement, ensuring we continue to align with user requirements. The insights gathered during this phase were essential for shaping the next steps of development, helping us address the evolving needs and expectations of our users.

During the fourth iteration, additional feedback highlighted several key areas. The positive feedback emphasized the platform's dynamic and intuitive design, particularly noting the ease of use in customer authentication, which facilitated easy access to the system. However, there were notable concerns regarding the platform's functionality. Users pointed out that the "create thesis theme" page lacked customization options, making it difficult to add extra inputs during the thesis theme creation process. Additionally, the AI-generated suggestions sometimes failed to provide valuable topics that contributed to societal needs, indicating a need for more thoughtful and impactful AI outputs.

To address these issues, several improvements were suggested. Firstly, incorporating ethical and social considerations into the AI's thesis creation process by including mandatory inputs about the relevance and impact of the thesis topic. This will ensure that teachers and students contemplate the broader implications of their research from the outset. Secondly, enhancing the customizability of the "create thesis theme" page to allow users to add new inputs as required. This flexibility will enable

users to tailor the thesis creation process to their specific needs and preferences. Lastly, improving the teachers' profiles by displaying more academic information, such as expertise, qualifications, and research interests. This addition will assist students in making more informed decisions when seeking guidance or selecting courses. By implementing these improvements, the platform aims to provide a more efficient, customizable, and socially aware tool for its users, ensuring it meets their needs and expectations.

Table 18. Interviews with Supervisors ID 6

	ID	Professor Supervisor Synthesis	Professor Supervisor Opinion
Pros	P.7	"The platform is very dynamic and intuitive."	The customer authentication is very intuitive and easy to use, facilitating easy access.
	P.9	"Creating a thesis topic is quick and customizable."	Creating a thesis topic is quick and customizable, allowing for easy generation of desired inputs and adaptation to various needs.
	P.10	"Useful visibility toggle."	The ability to save a proposal and toggle its visibility for other users is very useful.
Cons	C.6	"The 'create thesis theme' page is not customizable."	Due to the extensive information required, it is not possible to add extra inputs when creating a thesis theme proposal.
	C.7	"The suggestions given by AI could not add any value for society."	When using AI for suggestions of thesis themes, any topic can be generated, and sometimes the suggestions lack societal value.
Improvements	I.8	"Take into consideration the ethical and social use of AI for creating thesis themes."	To address concerns about the ethical and social value of proposed theses, it would be useful to include two mandatory inputs before creating a thesis topic: What is the relevance of this thesis topic? What economic and social impact will the development of this thesis topic have?
	I.9	"Make the 'create thesis theme' page more customizable."	To allow each user to adapt the page to their needs, it would be useful to enable adding new inputs as desired.
	I.10	"Improve the presentation of the profile for other students."	To assist students, it would be beneficial to display more academic information in the teachers' profiles. This would facilitate better understanding of their expertise, qualifications, and research interests, helping students make more informed decisions when seeking guidance or choosing courses.

4.5. Fifth DSR Iteration

At this stage, all interviews with the supervisor professor user type have been completed. The latest suggested improvements from the previous iteration's interviewee have been considered.

4.5.1. Proposal

In this fifth iteration, the features designed for the supervisor professor type were improved and finalized, considering the improvements listed in Table 19. Additionally, features for the student user type were developed.

Table 19. Improvements after the Fourth Iteration

Improvement	ID	Type of Improvement	Implemented	Suggested by
"Take into consideration the ethical and social use of AI for creating thesis themes."	I.8	Optimization page "create thesis theme"	Yes	Interviewee Professor Supervisor
"Make the 'create thesis theme' page more customizable."	I.9	Optimization page "create thesis theme"	Yes	Interviewee Professor Supervisor
"Improve the presentation of the profile for other students."	I.10	Optimization page "profile"	Yes	Interviewee Professor Supervisor

To increase professors' awareness when creating thesis topics with the aid of artificial intelligence, two new questions have been added to the thesis topic creation page. These questions encourage users to reconsider the rationale and impact of their proposed topics. Additionally, to improve the customizability of the page, users can now add fields to tailor the information to their specific needs. These improvements (I.8 and I.9) are illustrated in Figure 30.

Regarding improvement I.10, several informative fields have been added to the professor-supervisor profile, including teaching and supervision, scientific productions and citations, projects and research, and other activities. These fields provide users with detailed insights into the academic background and relevant information about the professors. These changes are visible in Figure 31.

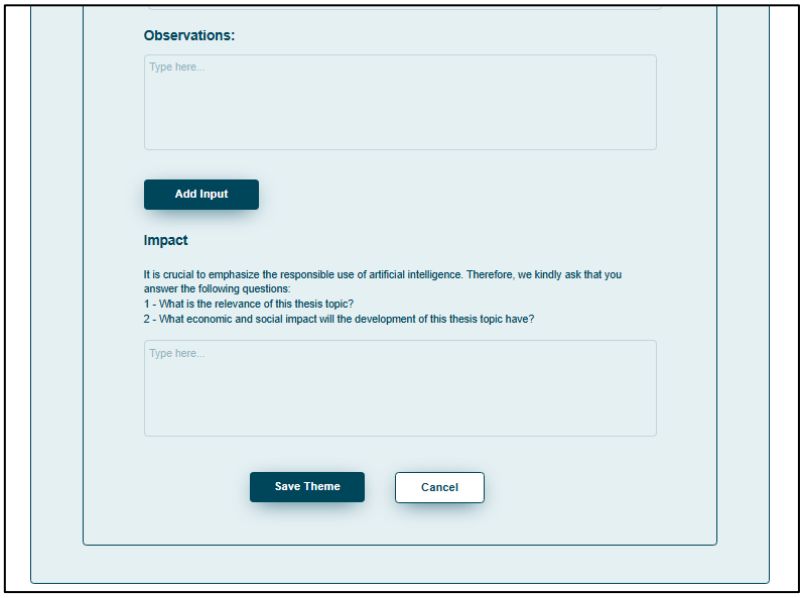


Figure 30. Improvements made in Feature F.9.1

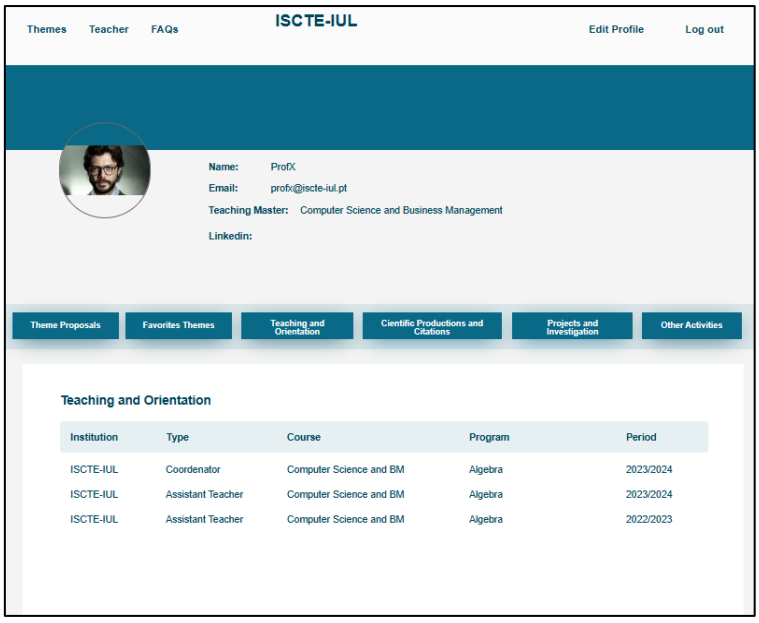


Figure 31. Improvements made in Feature F.9

4.5.2. Demonstration

In this iteration, the interviewee created an account and updated their profile. They then accessed lists of universities, schools, master's programs, and theses, selecting their preferences. Next, they returned to their profile and navigated to the "Find Ideal Thesis Theme" page. By entering their master's program and preferences, and with the assistance of artificial intelligence, the platform generated three available thesis topics based on their inputs.

Finally, the user returned to their profile, selected one of their preferred thesis topics, and chose to apply for it. They were then redirected to the "Apply for Thesis Topic" page, where they could enter

a message as showed in Figure 35. This message, along with the user's CV, was automatically sent to the email of the professor responsible for the chosen thesis topic.

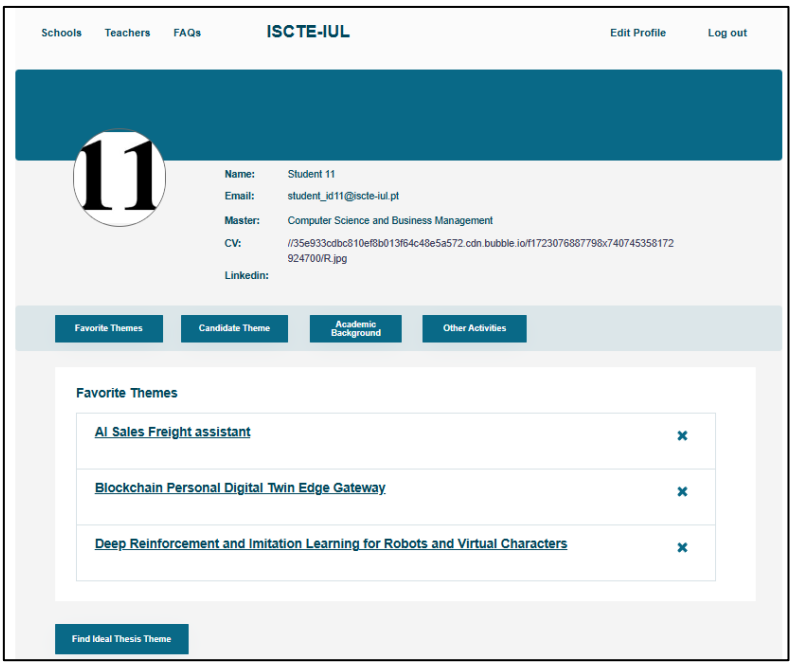


Figure 32. Feature F.8

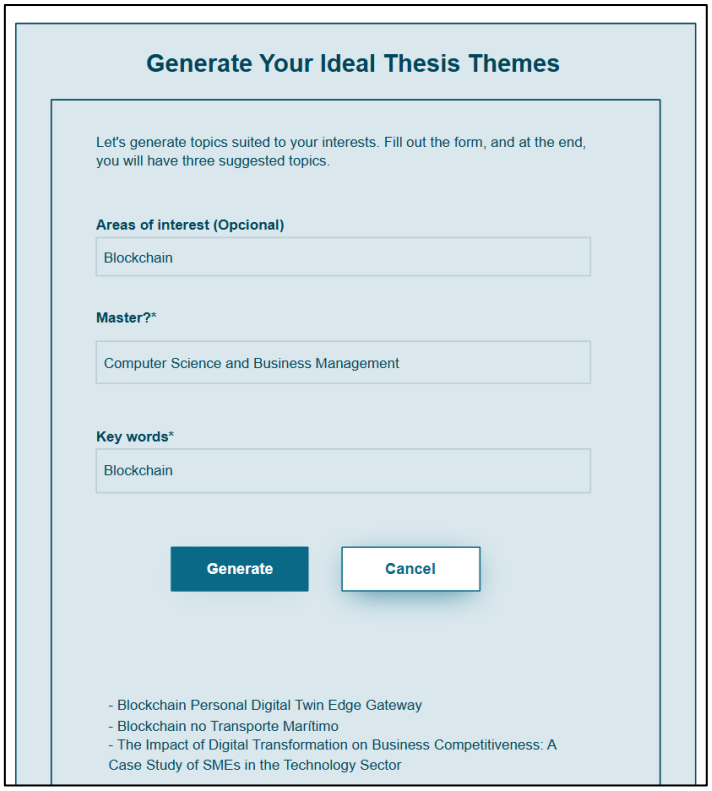


Figure 33. Feature F.8.2

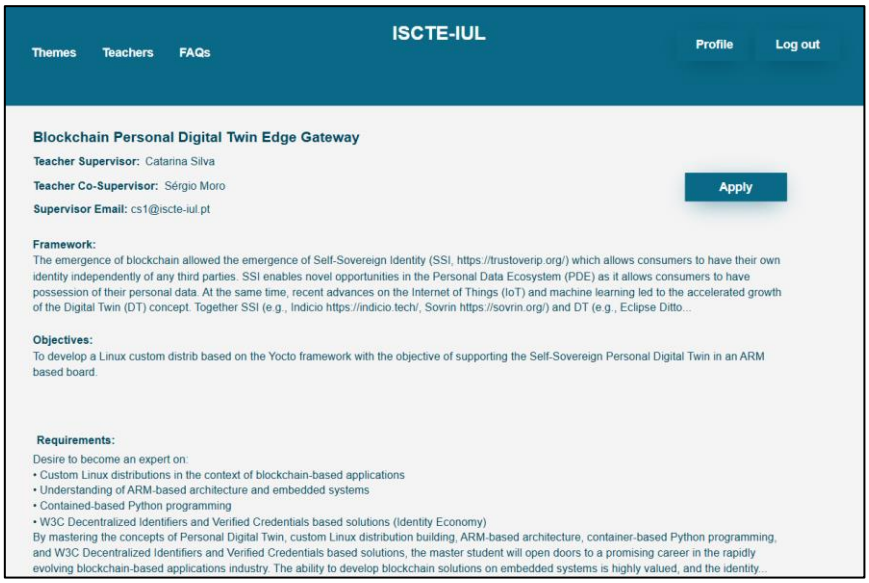


Figure 34. Feature F.7

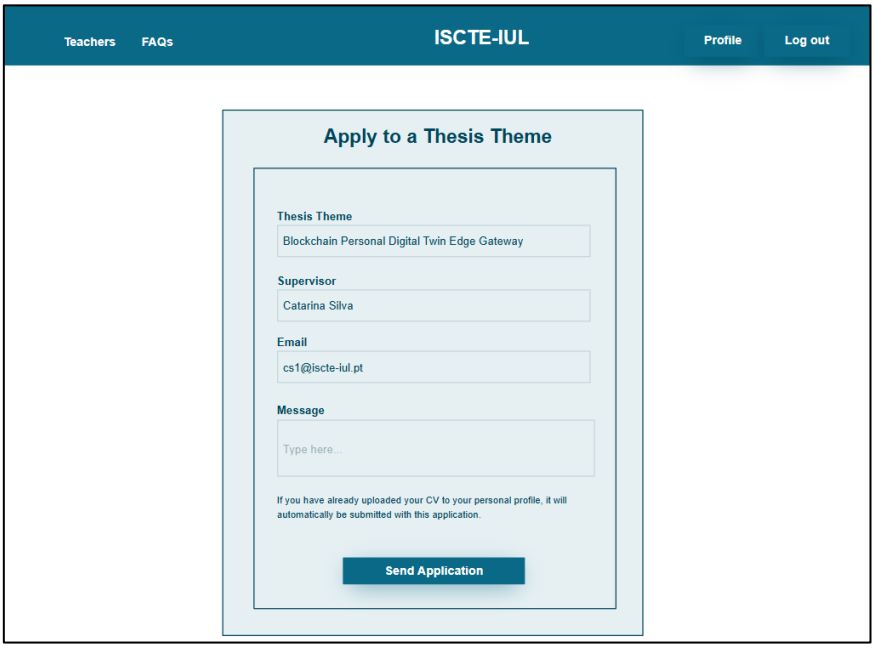


Figure 35. Feature F.8.1

4.5.3. Evaluation

After the fifth interview with a student, three positive aspects, four negative aspects, and four suggested improvements were collected. It was evident that significant improvements had been made throughout this process, bringing us closer to the final artifact proposal. The feedback received has been invaluable in refining the platform and ensuring it better meets the needs and expectations of its users.

Table 20. Interviews with Student ID 11

	ID	Student Synthesis	Student Opinion
Pros	P.11	“Saving favorite topics in the profile.”	“Saving preferred topics in the profile is practical and easily accessible.”
	P.12	“The suggestion of thesis topics is very helpful and useful.”	“The suggestion of thesis topics is extremely beneficial, assisting students by providing valuable guidance in identifying relevant and suitable research areas.”
	P.13	“Applying for a thesis topic is straightforward.”	“Applying for a thesis topic is straightforward. Submitting your CV directly to the professor streamlines the process, making it quick and establishing a clear and direct line of communication with the professor regarding the topic.”
Cons	C.8	“The "Find Ideal Thesis Theme" is limited.”	“The "Find Ideal Thesis Theme" page does not allow for the creation of thesis ideas unless they are proposed by supervisor professors.”
	C.9	“Students cannot create their own thesis theme proposals.”	“There is no option for students to create their own thesis proposal.”
	C.10	“Button “Teachers” in the menu bar does not work.”	“The button “Teachers” in the menu bar does not work.”
	C.11	“The design is lacking adjustments.”	The design could be improved and made more consistent across the various pages.
Improvements	I.11	“Allow students to create their own thesis proposals.”	“Enable students to generate and submit their own thesis theme proposals, providing more flexibility and encouraging creativity.”
	I.12	“Expand the "Generate Ideal" Feature.”	“Modify the "Generate Ideal" page to allow the generation of thesis ideas beyond those proposed by supervisor professors, giving students more options and autonomy in their research.”
	I.13	“Generate Ideal Professor Supervisor.”	“Allow the generation of ideal professors based on student preferences.”
	I.14	“List all professors-supervisors.”	“A list of all professor supervisors by master would be very helpful.”

4.6. Sixth DSR Iteration

In the sixth iteration, the artifact underwent a thorough refinement based on the feedback collected from the previous phase.

4.6.1. Proposal

This iteration focused on integrating the latest improvements to boost functionality and user experience, as detailed in Table 21. The primary objective was to address specific areas of concern identified earlier, leading to a more cohesive and effective design. The iteration demonstrated significant progress, with the artifact evolving to better meet user expectations and project requirements. This preparatory phase was critical in setting up for the final iteration, where the refined features were expected to deliver the desired impact and usability.

Table 21. Improvements after the Fifth Iteration

Improvement	ID	Type of Improvement	Implemented	Suggested by
“Allow students to create their own thesis proposals.”	I.11	Feature	Yes	Interviewee Student
Expand the "Generate Ideal" Feature.	I.12	Feature	Yes	Interviewee Student
“Generate Ideal Professor Supervisor.”	I.13	Feature	Yes	Interviewee Student
“List all professors-supervisors.”	I.14	Feature	Yes	Interviewee Student

To implement the proposed improvements, the "Create Thesis Theme" feature (new feature F.8.3) was added. This feature allows students to create a thesis proposal that will be displayed on their profile and in a list available to professors-supervisors (new feature F.9.4), as shown in Figure 36. Professors can easily access this list through the "Student Proposals" button in the master's program menu, as shown in Figure 36. This list enables professors to review student proposals and profiles and contact them if interested in collaboration. The F.8.3 feature will also incorporate AI assistance in generating inputs, similar to the feature available to supervising professors (Feature 9.1). Additionally, the "Edit My Proposal" feature (F.8.4) was added, allowing users to edit their proposed thesis topic.

Furthermore, the "Professors-Supervisors" feature was added to the user type (new feature F.8.5), providing a list of all professors-supervisors along with their associated profiles to facilitate the search and communication process. This list can be easily accessed from the main menu bar through the "Teachers" button, as demonstrated in Figure 38.

Finally, feature F.8.2 was retained and enhanced by adding an option to return professors that match the student's preferences. All these improvements effectively address the negative points raised in the previous iteration.

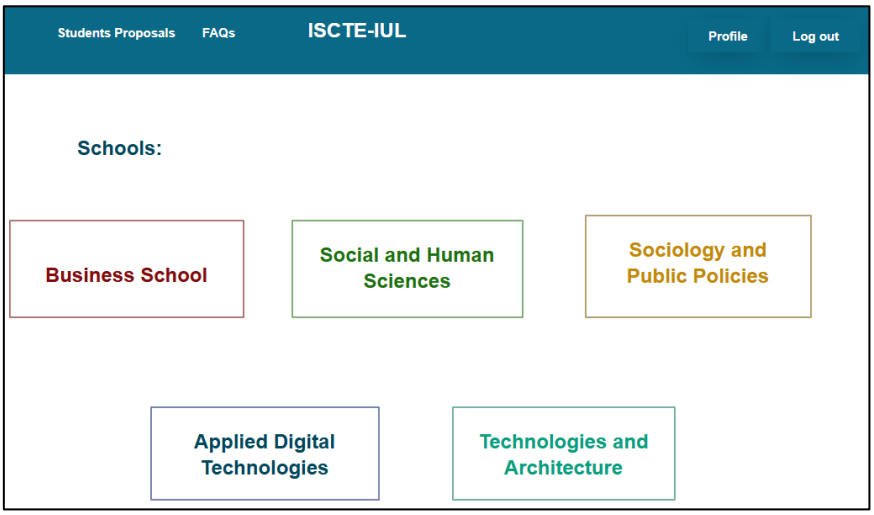


Figure 36. Feature F.5

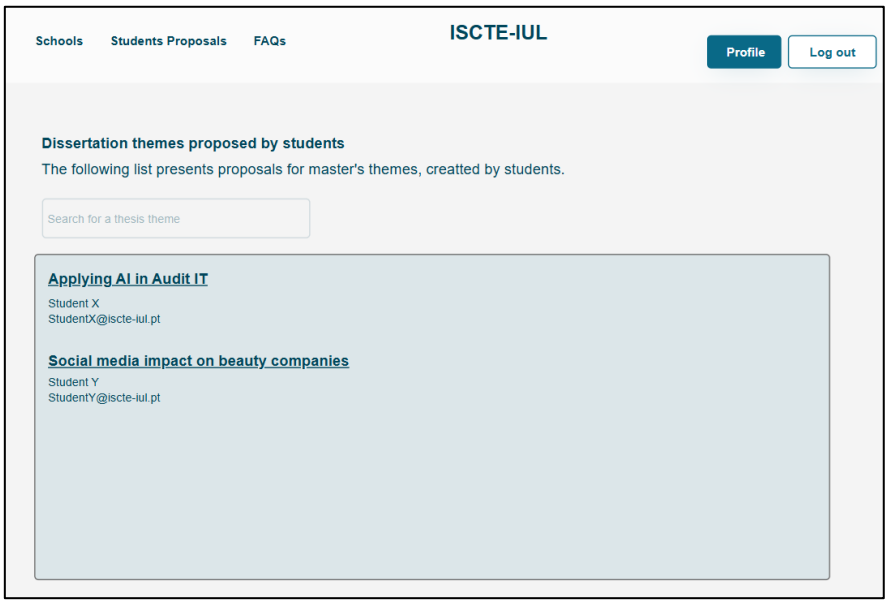


Figure 37. Feature F.9.4

Figure 38. Feature F.8.5

4.6.2. Demonstration

In this sixth iteration, the user created their account, accessed various thesis topics available in their master's program, and saved some as favourites. Subsequently, they decided to create their own thesis proposal, as shown in Figure 39. By entering two keywords, the necessary set of parameters was generated. The user also specified that they did not have a supervising professor, which will be reflected in the list of proposals available to professors-supervisors through feature F.9.4. Afterward, the student saved the proposed topic and was redirected to their profile, where they clicked the "Find Ideal Thesis Theme" button. This redirected them to feature F.8.2, which allowed them to generate three suggested thesis topics and three ideal supervising professors for the researched theme by searching their master's program and entering two keywords, as demonstrated in Figure 41.

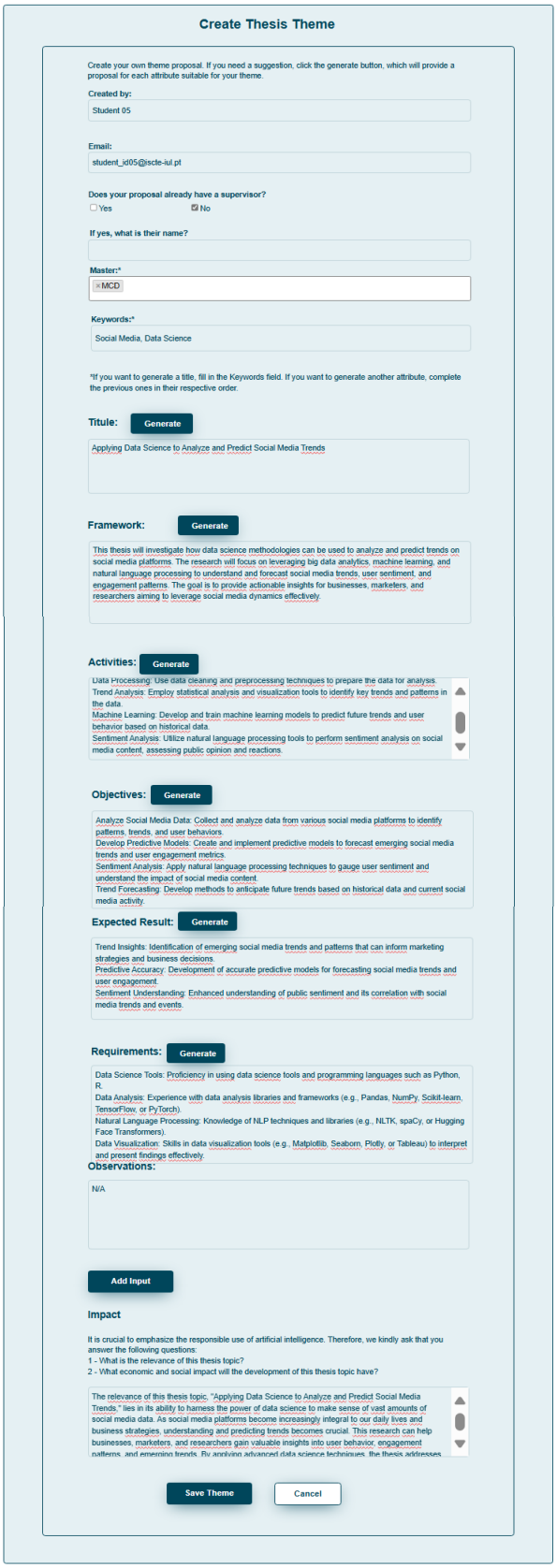


Figure 39. Feature F.8.3

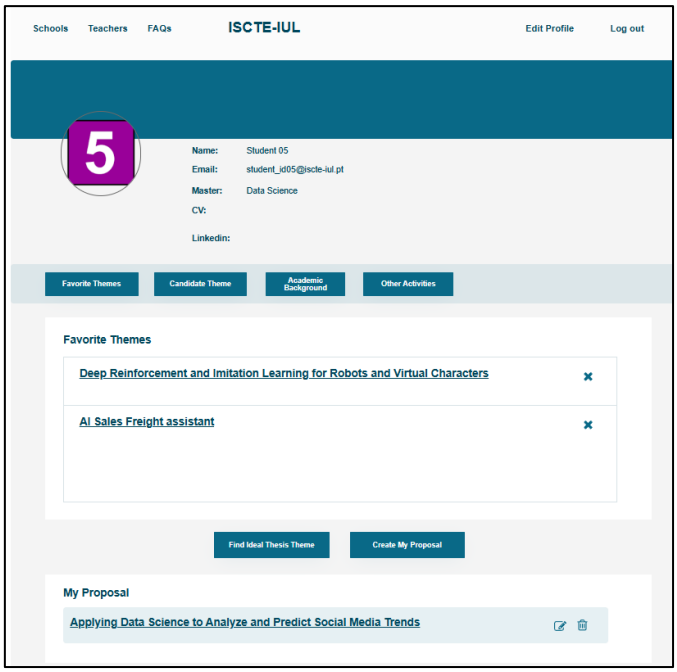


Figure 40. Feature F.8

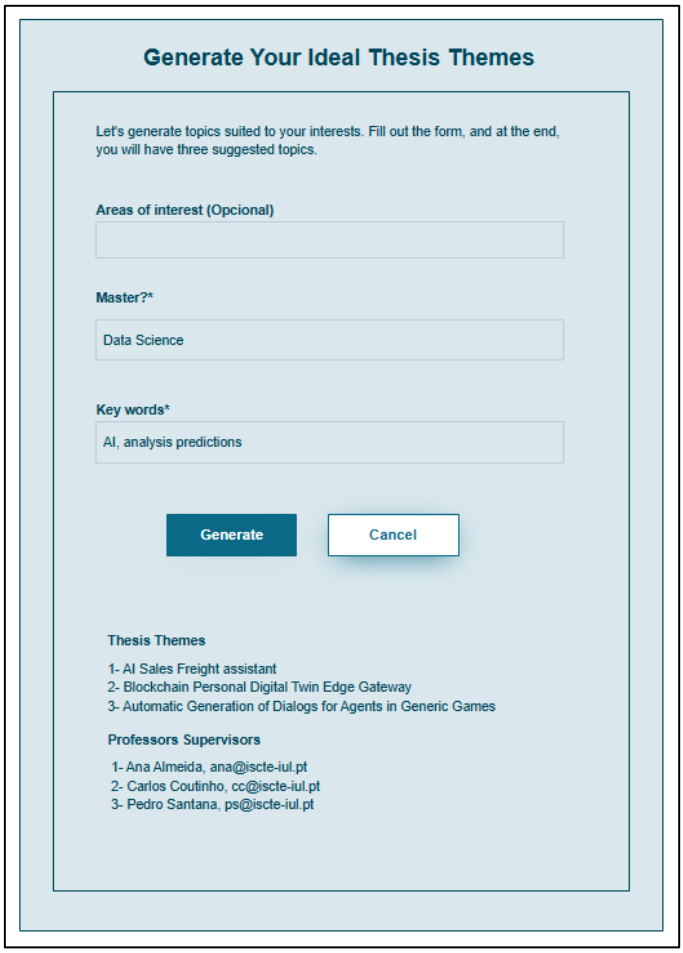


Figure 41. Feature F.8.2

4.6.3. Evaluation

After this sixth iteration, four positive aspects, two negative points, and one area for improvement were identified. The positive feedback highlights the effectiveness of the recent changes, while the negative points are focused on inconsistencies in the design. The suggested improvement revolves around fine-tuning these design elements to enhance the overall user experience. This iteration shows significant progress, bringing us closer to the desired outcome, though further refinement is needed to ensure a cohesive and polished design.

Table 22. Interviews with Student ID 5

	ID	Student Synthesis	Student Opinion
Pros	P.14	"The "Find Ideal Thesis Theme" is extremely useful."	The section for finding existing proposed thesis topics through keyword search streamlines the search process.
	P.15	"AI Interaction in Thesis Creation."	The interaction with AI during thesis creation greatly facilitates gathering assistance, reduces the time spent, and provides guidance, especially when a student feels lost.
	P.16	"Comprehensive Thesis Topic Creation and Discovery Tools."	Everything a student needs to start the process of finding or creating the ideal thesis topic is included on the platform.
	P.17	"Easy-to-Navigate Platform for Students."	The platform has demonstrated itself to be user-friendly, responsive, and straightforward, enabling students with no previous experience in thesis topic creation to swiftly adapt and start using the system efficiently.
Cons	C.12	"Some pages are not in the same aesthetic theme."	There is a lack of aesthetic coherence between some pages.
	C.13	"Some buttons are not the same size."	Some buttons and details are not aligned in the same visual aesthetic.
Improvements	I.15	"Design and Visual Appeal."	The design could benefit from improvements to make it more visually appealing and engaging. Improving the aesthetics and user interface could lead to a more attractive and enjoyable experience.

4.7. Seventh DSR Iteration

Following the insights gained from this sixth iteration, we were able to construct the final proposal for this product. Throughout this section, we will explore the specific improvements that have been incorporated into the final design. This iteration was designated as the final one because it successfully addressed the major concerns and suggestions raised during previous iterations, resulting in a product that aligns closely with user expectations. The comprehensive feedback and continuous refinements have culminated in a well-rounded solution that not only meets the intended objectives and standards but also ensures a more user-centred and effective experience.

4.7.1. Proposal

In this final iteration, the artifact was meticulously refined to incorporate the improvement identified in the previous round of feedback. This improvement, detailed in Table 23, is crucial in optimizing the user experience and ensuring that the artifact fully aligns with the project's overarching goals. With these final adjustments, the platform is now well-positioned to meet user needs effectively and deliver on its intended objectives.

Table 23. Improvements after the Sixth Iteration

Improvement	ID	Type of Improvement	Implemented	Suggested by
"Design and Visual Appeal."	I.15	Visual	Yes	Interviewee Student

The improvement for this iteration focuses on the design and visual aspects of the platform. Various updates were implemented to elevate the platform's aesthetics, making it more visually appealing. Additionally, design inconsistencies between pages were standardized, as illustrated in Figures 42 and 43.

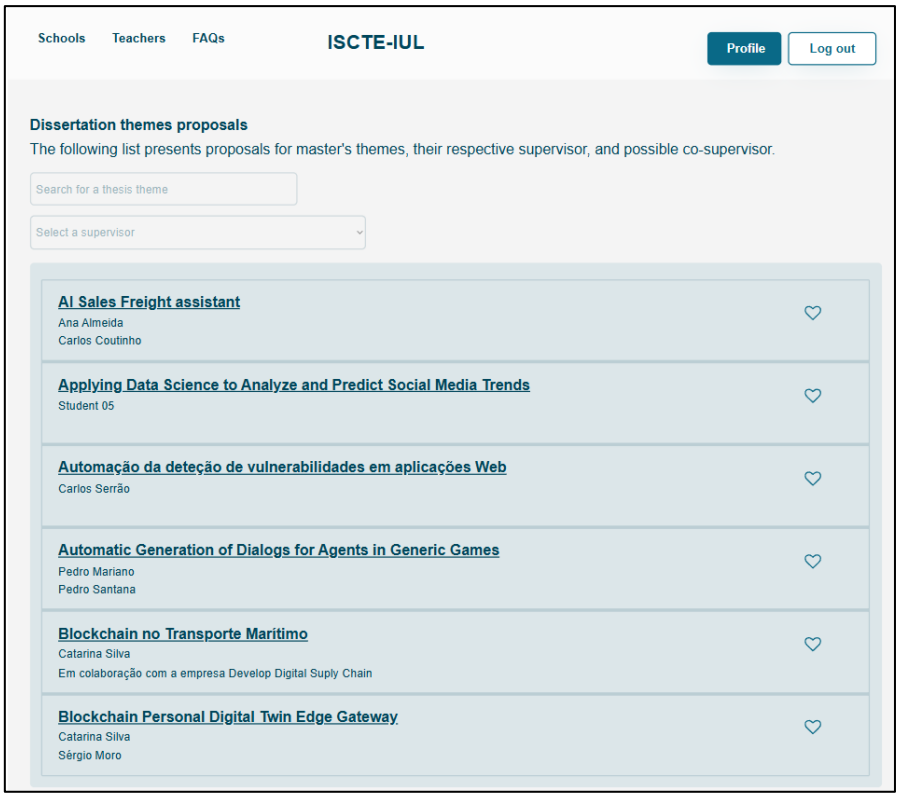


Figure 42. Feature F.6

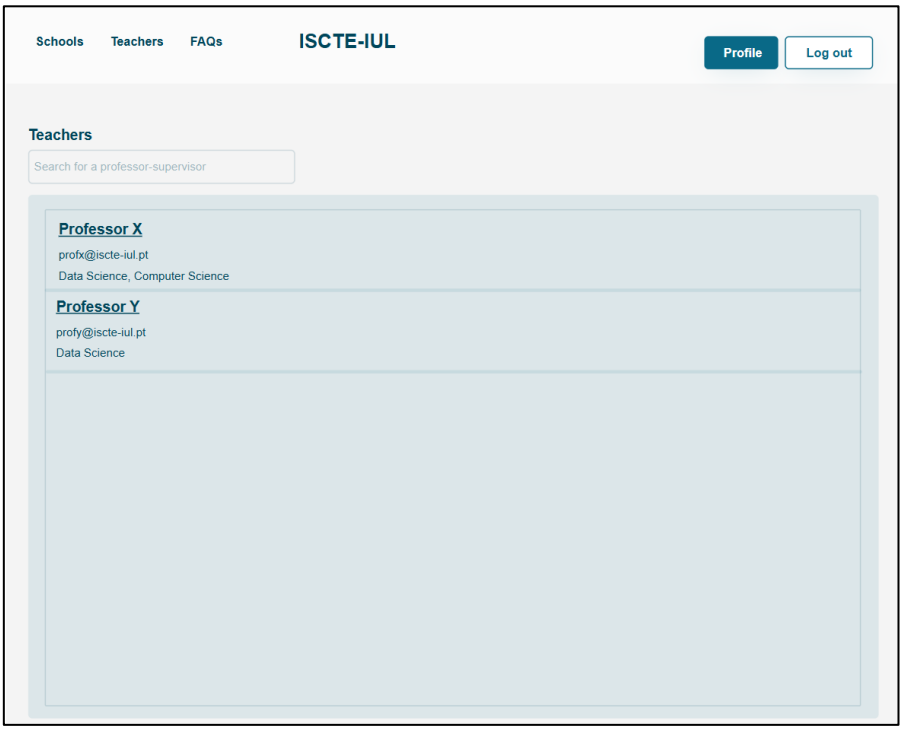


Figure 43. Feature F.8.5

4.7.2. Demonstration

In this final iteration, the user explored all the available features for the student user type, where they were able to perform various interactive functions. They reviewed the available thesis topics, consulted the list of supervising professors, updated their profile, and created a thesis proposal.

4.7.3. Evaluation

The final evaluation of the artifact revealed that the features implemented had a significant impact, generating excitement and a high level of satisfaction among the users. Feedback from this iteration was notably consistent with earlier rounds, indicating that the artifact had successfully met its intended objectives. The consensus among users suggested that the artifact had reached a mature and effective state, with most feedback focusing on minor semantic adjustments rather than major usability or aesthetic changes. This consistency in feedback confirmed that the artifact effectively addressed the users' needs and delivered a unique value, aligning closely with the goals of the platform.

4.8 DSR Synthesis

After completing 15 iterations, several improvements were implemented, as detailed in Table 24. Out of these, 8 improvement proposals came from teacher supervisors and 7 from students. In total, 15 proposals were made, with 14 successfully implemented. The majority of these improvements were successfully integrated, with only 1 still pending implementation. This collaborative effort between faculty and students has significantly strengthened the quality and functionality of the project.

Table 24. Proposed Improvements by Iteration

	ID	Proposed Improvement	Implemented?	Suggested by	Figure
First Iteration	I.1	"Add a favorite button to save the thesis themes."	Yes	Interviewee Professor Supervisor	15
	I.2	“Add search filters.”	Yes	Interviewee Professor Supervisor	15
Second Iteration	I.3	“Improve platform performance speed.”	No	Interview Student	-
	I.4	“Integrate a feature to create contact with potential thesis professors’ supervisors.”	Yes	Interview Student	35
Third Iteration	I.5	“Make the thesis themes visible/invisible for other users.”	Yes	Interviewee Professor Supervisor	29
	I.6	"Optimize the process of creating thesis themes and facilitate the process."	Yes	Interviewee Professor Supervisor	28
	I.7	"Optimize and improve the generative AI page."	Yes	Interviewee Professor Supervisor	28
Fourth Iteration	I.8	"Take into consideration the ethical and social use of AI for creating thesis themes."	Yes	Interviewee Professor Supervisor	30
	I.9	"Make the 'create thesis theme' page more customizable."	Yes	Interviewee Professor Supervisor	30
	I.10	"Improve the presentation of the profile for other students."	Yes	Interviewee Professor Supervisor	32
Fifth Iteration	I.11	“Allow students to create their own thesis proposals.”	Yes	Interviewee Student	40
	I.12	Expand the "Generate Ideal" Feature.	Yes	Interviewee Student	41
	I.13	“Generate Ideal Professor Supervisor.”	Yes	Interviewee Student	41
	I.14	“List all professors-supervisors.”	Yes	Interviewee Student	43
Sixth Iteration	I.15	“Design and Visual Appeal.”	Yes	Interviewee Student	42; 43

CHAPTER 5

Conclusion

This research aims to develop a platform that, through the integration of AI, assists students in the decision-making process. Design Science Research (DSR) was the chosen research methodology, and a series of interviews were conducted to gather the features and requirements for this platform.

Through these interviews, and due to the type of sample selected, the focus of the problems identified in the students' decision-making process centred on choosing a master's thesis topic. Consequently, a straightforward and useful platform for selecting master's thesis subjects and supervising professors was established. With ISCTE University as the main example, this portal is meant for all master's students as well as supervising academics from different universities. The platform is easy to use and does not require any prior expertise. It is quick and simple to use. Its goal is to help students who are unclear about how to proceed choose a topic for their master's thesis.

Following the interviews, a list of the features collected in section 4.1.1 was revised and some additional features were included. This served as the foundation for the development and structuring of the artifact until the platform was finished.

It was determined that the use of this application optimizes, accelerates and improves the decision-making process while selecting a master's thesis topic. According to the interviewees, the platform greatly enhanced communication between master's students and the supervising professors. They also believed that artificial intelligence was a useful tool for coming up with fresh concepts and inspiration.

Several features were particularly highlighted, such as the "Create Thesis Theme" tool, which, with the help of AI, guides students in developing the most suitable thesis topics. Another noteworthy feature is the profile page, which enables both students and teachers to view the backgrounds of other users and save their favourite selected themes.

Lastly, it was possible to create a platform that adds value to the academic experience by streamlining the thesis selection process and fostering better connections between students and faculty.

5.1. Limitations

One limitation of this research is that most of the interviewees were members of ISCTE, which constrained the platform's development, making it more tailored to this specific context. As a result, the platform may not fully address the needs and preferences of students and faculty from other universities.

Additionally, the lack of experience in UX/UI design posed a challenge in creating an optimal user experience. This limitation may have affected the platform's overall usability and accessibility, potentially limiting its effectiveness in guiding students through the decision-making process for selecting a master's thesis topic. Further refinement and testing with a more diverse user base would be necessary to enhance the platform's adaptability and user experience.

5.2. Future Work

For future work, it would be highly beneficial to test the integration of this platform with a university's existing systems, customizing and adapting it to meet the specific needs of the selected institution. Additionally, based on feedback gathered during the interviews regarding UI/UX improvements, it would be valuable to collaborate with UX/UI design experts or to undergo relevant training or courses. This would help to acquire more design skills and best practices for the platform, enhancing the overall user experience.

Given the feedback related to the social and economic aspects of creating new master's thesis topics and the role of AI in this process, it would be interesting to study the quality and relevance of the AI-generated topics over time. Understanding how AI has impacted the creation of new thesis topics, and the rigor of these topics could provide valuable insights into the platform's effectiveness and potential areas for improvement.

The creation of thesis topics using AI is seen as having immense potential, and the continued development of AI algorithms for topic suggestion and tutor matching could significantly enhance the platform's functionality.

Finally, another potential improvement would be integrating the platform with existing project databases, making it easier for students to find related work. For instance, creating an API connection to a thesis database (e.g., Scopus) could allow the platform to return related works directly on the thesis detail page. This feature would give students a comprehensive view of related research and set clear expectations for their own work.

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Appendices

Appendix A

Table A1. Selected Studies

ID	Title	Author	Year	Type	Source
1	Exploring generative artificial intelligence preparedness among university language instructors: A case study	Kohnke et al.	2023	Article	Computers and Education: Artificial Intelligence
2	Generative AI for Programming Education: Benchmarking ChatGPT, GPT-4, and Human Tutors	Phung et al.	2023	Article	ACM Digital Library
3	Educator and Student Perspectives on the Impact of Generative AI on Assessments in Higher Education	Smolansky et al.	2023	Short Paper	Proceedings of the 10th ACM Conference on Learning
4	RECIPE: How to Integrate ChatGPT into EFL Writing Education	Han et al.	2023	Short Paper	Proceedings of the 10th ACM Conference on Learning
5	My AI Wants to Know if This Will Be on the Exam: Testing OpenAI's Codex on CS2 Programming Exercises	Fannie-Ansley et al.	2023	Conference Paper	ACM International Conference Proceeding Series
6	How ChatGPT Will Change Software Engineering Education	Daun et al.	2023	Article	Annual Conference on Innovation and Technology in Computer Science Education
7	Acceptance of AI in Semi-Structured Decision-Making Situations Applying the Four-Sides Model of Communication—An Empirical Analysis Focused on Higher Education	Greiner et al.	2023	Article	Education Sciences
8	Accurate, timely, and portable: Course-agnostic early prediction of student performance from LMS logs	Santos et al.	2023	Article	Computers and Education: Artificial Intelligence

9	A comprehensive AI policy education framework for university teaching and learning	Chan	2023	Conferenc e Paper	International Journal of Educational Technology in Higher Education
10	A New Era of Learning: Considerations for ChatGPT as a Tool to Enhance Statistics and Data Science Education	Ellis et al.	2023	Article	Journal of Statistics and Data Science Education
11	Are deeper reflectors better goal-setters? AI-empowered analytics of reflective writing in pharmaceutical education	Li et al	2023	Article	Computers and Education: Artificial Intelligence
12	Challenges and Opportunities of Generative AI for Higher Education as Explained by ChatGPT	Michel-Villarreal et al.	2023	Article	Education Sciences
13	Challenges for higher education in the era of widespread access to Generative AI	Walczak et al.	2023	Article	Economics and Business Review
14	ChatGPT and the future of legal education and practice	Ajevski et al.	2023	Article	Law Teacher
15	ChatGPT in higher education: Considerations for academic integrity and student learning	Sullivan et al.	2023	Article	Journal of Applied Learning and Teaching
16	Developing middle school students' understanding of machine learning in an African school	Sanusi I. T. et al.	2023	Article	Computers and Education: Artificial Intelligence
17	Effects of Generative Chatbots in Higher Education	Ilieva	2023	Article	Information
18	Examining Science Education in ChatGPT: An Exploratory Study of Generative Artificial Intelligence	Cooper	2023	Article	Journal of Science Education and Technology

19	Fostering AI Literacy in Elementary Science, Technology, Engineering, Art, and Mathematics (STEAM) Education in the Age of Generative AI	Relmasira et al.	2023	Article	Sustainability
20	Generative Artificial Intelligence in Information Systems Education: Challenges, Consequences, and Responses	van Slyke et al.	2023	Article	Communications of the Association for Information Systems
21	Generative AI Assistants in Software Development Education: A vision for integrating Generative AI into educational practice, not instinctively defending against it	Bull et al.	2023	Article	IEEE Software
22	Generative artificial intelligence as a new context for management theories: analysis of ChatGPT	Korzynski	2023	Article	Central European Management Journal
23	Hello GPT! Goodbye home examination? An exploratory study of AI chatbots impact on university teachers' assessment practices	Farazouli	2023	Article	Assessment and Evaluation in Higher Education
24	How do we respond to generative AI in education? Open educational practices give us a framework for an ongoing process	Mills	2023	Article	Journal of Applied Learning and Teaching
25	Practising Student Voice in University Teaching and Learning: Three Anchoring Principles	Cook-Sather	2023	Article	Journal of University Teaching and Learning Practice
26	Students' voices on generative AI: perceptions, benefits, and challenges in higher education	C. K. Y. Chan et al.	2023	Article	International Journal of Educational Technology in Higher Education
27	The role of ChatGPT in higher education: Benefits, challenges, and future research directions	T. Rasul et al.	2023	Article	Journal of Applied Learning and Teaching
28	Unlocking the Power of ChatGPT: A Framework for Applying Generative AI in Education	J. Su et al.	2023	Article	ECNU Review of Education

Appendix B

Survey: First set of Interviews

Introdução:

Chamo-me Catarina Cabral estou no último ano do Mestrado em Informática e Gestão de Empresas. Este guião visa recolher informações detalhadas sobre as dificuldades enfrentadas por estudantes e docentes no processo de tomada de decisão ao longo do percurso académico. Através das perguntas, pretende-se identificar as principais barreiras, a necessidade de automatismos e o potencial uso de Inteligência Artificial (IA) como ferramenta de suporte no processo de tomada de decisão.

Instituição Universitária:

Área de Formação:

Idade:

Sexo:

Guião para Alunos e Docentes

1. Quais foram as maiores dificuldades encontradas no processo de tomada de decisão ao longo do seu percurso académico?

2. Pode descrever um momento específico em que teve dificuldades em tomar uma decisão importante? O que contribuiu para essas dificuldades?

3. Considera que recebeu o apoio necessário da sua instituição para auxiliar no processo de tomada de decisão? Em que áreas sentiu mais falta de apoio?

4. Quais recursos ou ferramentas, se disponíveis, teriam facilitado suas decisões durante o percurso académico?

5. Na sua opinião, existe uma falta de automatismos ou ferramentas digitais que possam simplificar o processo de tomada de decisão dos estudantes? Se sim, quais funcionalidades considera que fariam diferença?

6. Que tipo de suporte automatizado gostaria de ter disponível? (ex.: recomendações personalizadas, alertas, etc.)

7. Pode partilhar alguma experiência em que o uso de tecnologia facilitou sua tomada de decisão acadêmica?

8. Que sugestões daria para melhorar os processos atuais de apoio à decisão na sua instituição de ensino?

9. Acredita que a utilização de IA poderia ser uma mais-valia para apoiar e solucionar problemas no processo de tomada de decisão? Se sim, como imagina essa integração?

10. Que tipo de decisões acredita que a IA poderia ajudar a tomar? (ex.: escolha de disciplinas, orientação de carreira, seleção de temas de tese, etc.)

Appendix C

Survey: Second set of Interviews

Introdução:

Chamo-me Catarina Cabral estou no último ano do Mestrado em Informática e Gestão de Empresas. Esta entrevista, faz parte de um estudo que tem como objetivo investigar o processo de decisão de alunos e docentes na escolha de temas de mestrado e os seus respetivos orientados/orientadores. A compreensão desse processo é de extrema importância para auxiliares futuros no processo de tomada de decisões. Além disso, procuramos compreender a relevância das fontes de inspiração e pesquisa utilizadas pelos participantes ao tomarem suas decisões. Ao explorar os fatores que influenciam a seleção de temas, bem como os critérios envolvidos na escolha de um orientador/orientado, pretendemos obter insights valiosos sobre as motivações e desafios enfrentados pelos estudantes, docentes e profissionais nesse processo crucial.

Instituição Universitária:

Área de Formação:

Idade:

Sexo:

Guião para Alunos

1. Em algum momento já fez/ou irá fazer alguma tese de mestrado?

Opção A- Se não fez, mas irá realizar

1.1 Já tem tema de mestrado?

1.2 Qual metodologia usou/irá usar para escolher um tema?

1.3 E para escolher o docente que irá orientá-lo?

1.4 Quais as principais frustrações/dificuldades que poderia ter/tem tido ao longo deste processo?

Opção B- Se já fez uma tese de mestrado

1.1 Como efetuou o contacto com o docente que o orientou?

1.2 Como foi a sua experiência em geral? Positiva ou negativa? Tendo em conta, escolha do tema, processo de equipa, orientador, etc.

1.3 Quais foram as suas principais frustrações ao longo desse processo?

1.4 Acredita que este processo poderia ser mais facilitado? Como?

2. Assumindo sempre necessário as variáveis Tema, Aluno e Docente colaborador, que critérios considera fundamentais ter em conta neste processo de tomada de decisões? Por exemplo, área de estudo, interesse pessoal, disponibilidade do aluno, etc.

3. Considera que a utilização de IA seria uma mais valia, e poderia dar apoio e solucionar alguns problemas deste processo de decisão? Se sim, como?

Guião para Docentes

1. Já orientou/irá orientar algum tema mestrado? Se sim, como foi a sua experiência?

Opção A- Se nunca o fez, nem irá fazer:

1.1. Porquê? Tem alguma frustração relativamente a este tema/processo de decisão?

Opção B- Se nunca o fez, mas irá fazer:

1.1. Já tem tema de mestrado e orientando?

1.2. Qual metodologia usou/irá usar para propor um tema? Ou o mesmo será feito pelo aluno?

1.3. E para escolher o aluno que irá orientar?

1.4 Quais as principais frustrações/dificuldades que poderia ter/tem tido ao longo deste processo?

Opção C- Se já fez orientação de uma tese de mestrado:

1.1. Qual é a sua metodologia/fonte para propor temas?

1.2. E para escolher o aluno adequado ao(s) seu(s) tema(s)?

1.3. Como efetuou o contacto com o aluno que orientou?

1.4. Como foi a sua experiência em geral? Positiva ou negativa? Tendo em conta, escolha do tema, processo de equipa, orientador, etc.

1.5. Quais são as suas principais frustrações relativamente à escolha e sugestões de temas? E da escolha do aluno adequado? E do acompanhamento? E do processo em geral?

1.6. Acredita que este processo poderia ser mais facilitado? Como?

2. Considera que a utilização de IA seria uma mais valia, e poderia dar apoio e solucionar alguns problemas deste processo de decisão? Se sim, como?