INTELI - INSTITUTO DE TECNOLOGIA E LIDERANÇA
SOFTWARE ENGINEERING

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MODULE 1 - PUBLIC REPORT
INTERACTIVE VIRTUAL ENVIRONMENT FOR SECONDARY SCHOOLS: APPLYING VIRTUAL REALITY TO THE TEACHING-LEARNING PROCESS

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SÃO PAULO
2025

SUMMARY

1 INTRODUCTION

Over the past 10 weeks, the final course project titled “Interactive Virtual Environment for High Schools: Applying Virtual Reality to the Teaching-Learning Process” has made significant progress in its conceptual development, market research, and technical structuring. The initiative aims to address the challenges of traditional education, especially regarding student demotivation and the difficulty of assimilating abstract content, through the use of immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR).

In-depth analyses were conducted on the technical and pedagogical feasibility of using these technologies in the school environment, along with the development of the concept and initial functionalities of the proposed platform. The solution is designed to enable teachers to intuitively create and share immersive content, aligned with Brazil's National Common Curricular Base (BNCC) and contemporary pedagogical needs. The platform is expected to transform the way content is delivered, increasing student engagement and performance, while promoting the modernization of educational practices in Brazil.

The project began on February 4, 2025, and its completion is scheduled for December 19, 2025. This report outlines the progress made to date, including the problem statement and project overview, through introductory chapters such as the introduction, problem, justification, objectives, scope delimitation, assumptions, and constraints. It also details the modeling of key processes, including the business model canvas, empathy map, use cases, as well as functional and non-functional requirements.

The following sections are dedicated to what was accomplished in each of the three phases developed during the project's progression, along with a record of the classes attended throughout the project's timeline.

2 CONTEXT AND OBJECTIVE

The purpose of this public report is to clearly and structurally communicate the progress achieved during the first phase of the Final Undergraduate Project (TCC) development. This deliverable covers the progress made over the first 10 weeks of work, during which the theoretical, market, and conceptual foundations of the project were established, along with the proposal of an innovative technological solution aimed at basic education.

The report is published by Bruno Otavio Bezerra de Meira, a Software Engineering student at INTELI (Institute of Technology and Leadership), as part of the academic requirements. The target audience includes advisors, evaluators, educational institutions interested in pedagogical innovation, and stakeholders from the educational and technological sectors.

The motivation behind the project stems from the urgent need to make teaching more engaging and effective in light of the behavioral changes and expectations of the digital generation. Aligned with the guidelines of the BNCC, the project embraces an active, multimodal, and student-centered approach, using VR and AR as tools for pedagogical transformation.

3 EXPLORING THE FUTURE OF EDUCATION

In the first stage of the Final Undergraduate Project, we investigated the transformations that technology can bring to the Brazilian educational landscape, focusing on the application of Virtual Reality (VR) and Augmented Reality (AR) as innovative pedagogical tools. Based on a critical analysis of the limitations of traditional teaching and the growing need for active methodologies, the study proposes the development of interactive virtual environments capable of promoting greater engagement, motivation, and content retention among high school students.

Theoretical foundations supporting the adoption of these technologies were examined, as well as their contributions to knowledge building in subjects that require visualization, experimentation, and immersion. The general and specific objectives of the research were also defined, narrowing its focus to practices aligned with the National Common Curricular Base (BNCC) and the development of essential 21st-century skills.

Furthermore, the report discusses the assumptions, constraints, and rationale for implementing technological solutions in school environments, considering aspects such as infrastructure, teacher training, and accessibility. This first deliverable represents the conceptual foundation of the project, guiding the upcoming stages, which will include prototype development and practical testing with students and teachers.

4 BUSINESS ANALYSIS AND STRUCTURING

The second chapter is dedicated to the strategic analysis of the market and the structuring of the business model for the proposed solution. Through a literature review and national and international case studies, a positive trend was identified in the use of immersive technologies in education, especially in subjects such as Chemistry, History, Geography, Mathematics, and Biology.

The market analysis revealed clear gains in engagement, comprehension, and content retention when VR and AR are used as pedagogical support. However, significant obstacles were also identified, such as limited infrastructure in schools, challenges in teacher training, and a shortage of customizable solutions.

To address these gaps, a platform was proposed that allows teachers to create, adapt, and share immersive experiences easily, even without advanced technical knowledge. The project includes features such as:

a) Immersive content editor.
b) Class management.
c) Library of ready-to-use content.
d) Free or paid content sharing system.
e) On-demand content request functionality.

The business model was structured based on the Lean Canvas, taking into account the main customer segments (schools, teachers, students, content creators), the value proposition, distribution channels, strategic partners, and the cost and revenue structure. The planning also includes an initial estimated timeline, with well-defined phases for development, testing, and validation.

5 CONCEPTUAL DESIGN OF THE SOLUTION

This chapter focuses on the conceptual design of the solution. Using tools such as the Empathy Map, the main user profiles were analyzed: teachers, students, and educational institutions. Specific pains, desires, and needs were identified, helping to guide the platform's proposal.

Teachers, who play a central role in the process, require a solution that is intuitive, customizable, and integrated with their pedagogical planning. Students, on the other hand, seek a more engaging and participatory experience, aligned with their digital lifestyles. Institutions need a solution that is technically feasible, financially accessible, and capable of adding value to the teaching and learning process.

Based on this analysis, system use cases were defined, along with functional requirements (such as content creation, multi-platform access, and class management) and non-functional requirements (such as usability, compatibility with affordable devices, and support for different user profiles).

The platform was designed to work responsively and adaptively, supporting everything from VR headsets to smartphones with limited capabilities. An institutional intellectual property model was also included, in which content generated within a school belongs to the institution, ensuring legal compliance and data security.

6 WEEKLY CLASSES ATTENDED

This section lists the mandatory classes attended every Tuesday during the analyzed period.

- Feb 04, 2025: CAREER TRACK – Designing the Professional – What does success mean to you.
- Feb 11, 2025: CAREER TRACK – Designing the Professional – How to prototype your ideal career.
- Feb 18, 2025: CORPORATE TRACK – Project Management and Methodologies.
- Feb 25, 2025: CORPORATE TRACK – Innovation, Applied Research, and Digital Transformation.
- Mar 06, 2025: CORPORATE TRACK – The Job Market in Computing and Certifications.
- Mar 11, 2025: CORPORATE TRACK – Intellectual Property and Patents.
- Mar 18, 2025: CAREER TRACK – Designing the Professional – How to create a portfolio that stands out.
- Mar 25, 2025: CAREER TRACK – Designing the Professional – How to turn dreams into career plans.
- Apr 01, 2025: ACADEMIC TRACK – Structuring and Formatting Academic Articles: Standards and Styles.
- Apr 08, 2025: ACADEMIC TRACK – Structuring and Formatting Scientific Articles: How to Craft Powerful Introductions and Conclusions.