Fostering creativity, advanced technology, and personal growth: The impact of a magic-themed learning experience in primary education

Fomentant la creativitat, la tecnologia avançada i el creixement personal: l'impacte d'una experiència d'aprenentatge amb màgia a l'educació primària

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Abstract

This research explores the effects of a magic-themed, project-based learning approach on creativity, digital skills, personal growth, and emotional intelligence among 63 primary school students at Escola Sant Jordi. Students aged 8-10 participated in a series of activities where they created digital spells, virtual worlds, and interactive objects using tools like CoSpaces, Tinkercad, and micro:bit, integrating augmented reality and 3D printing. With a focus on incorporating technology into the learning process, the study investigates how imaginative themes can foster student engagement and development in these key areas.

Pre-test and post-test surveys, along with observational data, were used to assess improvements. The results revealed significant gains in creativity, technological confidence, use of English as a second language, self-awareness, and empathy. Students also showed greater excitement and engagement with the project, and a stronger willingness to share ideas with their peers.

The findings demonstrate that project-based learning, when combined with technology and creativity, can support holistic development. This approach not only builds technical skills but also fosters emotional growth, collaboration, and self-expression, empowering students to explore their strengths and passions. Future

studies could further explore how such learning experiences impact other areas of students' academic and personal development.

Keywords

3D design, computational thinking, creativity, digital competences, emotional intelligence, English as a second language, primary education.

Resum

Aquesta recerca explora els efectes d'un enfocament d'aprenentatge basat en projectes amb la temàtica de la màgia en la creativitat, les habilitats digitals, el creixement personal i la intel·ligència emocional entre seixanta-tres alumnes de primària de l'Escola Sant Jordi. L'alumnat, d'edats compreses entre els vuit i deu anys, va participar en una sèrie d'activitats en què va crear encanteris digitals, mons virtuals i objectes interactius utilitzant eines com CoSpaces, Tinkercad i micro:bit, incorporant-hi la realitat augmentada i la impressió 3D. Amb un enfocament basat en la integració de la tecnologia en el procés d'aprenentatge, l'estudi investiga com un tema transversal com la màgia pot fomentar el compromís i el desenvolupament de l'alumnat en aquestes àrees clau.

Per fer la recerca, s'han utilitzat enquestes a mode de pretest i posttest, juntament amb una rúbrica per recollir dades observacionals per poder avaluar les millores. Els resultats han revelat millores significatives en creativitat, ús de la tecnologia, ús de l'anglès com a llengua estrangera, autoconeixement i empatia. L'alumnat també ha mostrat més entusiasme i compromís amb el projecte, així com una major predisposició a compartir idees amb els companys i companyes.

Les conclusions demostren que l'aprenentatge basat en projectes, combinat amb la tecnologia i la creativitat, afavoreix el desenvolupament integral. Aquest enfocament no només millora les habilitats tècniques, sinó que també fomenta el creixement emocional, la col·laboració i l'expressió personal, capacitant l'alumnat per explorar els seus punts forts i les seves passions. Els futurs estudis podrien explorar més a fons com aquestes experiències d'aprenentatge impacten sobre altres àrees del desenvolupament acadèmic i personal de l'alumnat.

Paraules clau

Disseny 3D, pensament computacional, creativitat, competències digitals, intel·ligència emocional, anglès com a llengua estrangera, educació primària.

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1. Introduction

"The Magic in Me" is an innovative magic-themed project designed to enhance creativity, technological skills, and personal growth among primary school students. Integrating project-based learning (PBL) with digital tools such as CoSpaces, Tinkercad, and micro:bit, the project immerses students in a world of imagination and hands-on learning. Over the course of the project, students engage in activities where they design and create digital spells, virtual worlds, and interactive objects, integrating augmented reality and 3D printing. By merging technology with creative expression, the project encourages students to explore new ideas, develop critical problem-solving skills, and collaborate with their peers. Beyond technical skills, "The Magic in Me" also focuses on fostering emotional intelligence, self-awareness, and empathy, as students reflect on their personal growth and learn to manage their emotions. This thematic, technology-driven approach provides a dynamic learning environment where students not only gain essential 21st-century skills but also experience the power of creativity and innovation in education.

As educational paradigms shift toward more interactive and engaging methodologies, the incorporation of imaginative themes like magic can stimulate students' natural curiosity and encourage them to explore complex concepts through creative expression. Research indicates that project-based learning (PBL), particularly when infused with thematic elements, is aimed to lead to substantial improvements in students' creative thinking and problem-solving abilities (Hanif et al., 2019; Lubis et al., 2018). By engaging in activities such as designing spells or creating virtual magical worlds, students are not only encouraged to think critically but also to apply their digital skills in practical, real-world scenarios.

The dynamic nature of the project fosters an environment where students can experiment and innovate. This aligns with findings that suggest project-based learning enhances students' creativity by allowing them to engage in hands-on activities that require critical thinking and collaboration (Lubis et al., 2018). The thematic approach of magic can serve as a powerful motivator, capturing students' imagination and encouraging them to immerse themselves in the learning process. This increased engagement is planned to lead to measurable improvements in students' digital literacy as they navigate various digital tools to bring their magical creations to life (Usmeldi, 2019; Rahayuningsih, 2024).

In supporting the development of students' digital competencies, the project integrates a variety of technologies within a structured framework designed to promote creativity and critical thinking. Tools like CoSpaces, Tinkercad, and micro:bit facilitate the creation of digital spells, virtual worlds, and interactive objects,

encouraging students to explore both the artistic and technical aspects of their projects. The use of CoSpaces promotes interactive storytelling and spatial creativity through virtual environments, while Tinkercad and micro:bit provide opportunities for hands-on design and coding, fostering skills in 3D modelling, engineering, and basic programming. By applying a constructivist learning framework (Papert, 1980), students are intended to engage in experiential learning, where they actively build knowledge through exploration and creation, making the technologies not just tools but part of the learning process itself. This multimodal approach to learning provides students with diverse entry points for self-expression, enhancing both their engagement and proficiency with technology.

Moreover, integrating technology within this thematic framework is intended to enhance students' proficiency in digital skills and competences. Research has shown that project-based learning that incorporates technology not only improves students' digital skills but also fosters a deeper understanding of the subject matter. By incorporating digital tools to create and share their magical projects, students develop essential 21st-century skills, including adaptability, collaboration, and innovation. These skills are increasingly vital in a technology-driven society, where the ability to think creatively and use digital resources is paramount (Syarifah & Emiliasari, 2019; Ayu et al., 2023).

In addition to enhancing creativity and digital skills, a magic-themed project can contribute significantly to students' personal development and emotional intelligence. Engaging in creative tasks allows students to reflect on their emotions, strengths, and weaknesses, fostering self-awareness and empathy. Emotional intelligence is crucial for children's overall development, as it supports their ability to navigate social interactions and manage their emotions (Chiang & Lee, 2016; Jalinus et al., 2017). The project is aimed at encouraging students to create personal artefacts related to their magical experiences, facilitating discussions about their meanings and promoting emotional reflection (Acoci et al., 2022). This reflective practice can enhance students' emotional intelligence, equipping them with essential skills for personal growth and interpersonal relationships.

Furthermore, the incorporation of emotional education within the project is essential for fostering student engagement and success. Studies have demonstrated that emotional intelligence positively correlates with academic achievement and work engagement, highlighting the importance of providing learning experiences that nurture emotional development (Fajrina et al., 2023; Lubis & Lubis, 2019). By integrating elements of emotional education into the project, educators can create a holistic learning environment that supports students' emotional well-being and personal growth.

The thematic approach of magic, combined with project-based learning, also has the potential to foster higher engagement and self-expression among young learners. The immersive nature of magical storytelling is designed to allow students to connect with the material on a deeper level, encouraging them to express their thoughts and ideas freely. This increased engagement can lead to a greater willingness to participate in collaborative activities and share their creative outputs with peers. Research has indicated that thematic learning environments enhance student motivation and self-expression as they provide meaningful contexts for exploration and discovery (Cahyani, 2021; Glazunova et al., 2022).

The hands-on activities associated with the project can promote active learning, allowing students to take ownership of their educational experiences. This active engagement is essential for fostering a sense of agency and empowerment among students, which can lead to improved academic outcomes and personal development. By encouraging students to collaborate on magical projects, educators can facilitate the development of teamwork and communication skills, further enhancing the overall learning experience.

“The Magic in Me” project can have profound effects on students’ creativity, digital skills, personal development, and emotional intelligence. By providing an imaginative and interactive learning environment, educators are focused on fostering innovation, adaptability, and emotional expression among young learners. The thematic approach not only can enhance engagement and self-expression but can also support the development of essential 21st-century skills that are crucial for success in an increasingly technology-driven world. As such, the project represents a promising framework for promoting holistic development in primary education.

The integration of technology in this educational project is fundamentally supported by the technological pedagogical content knowledge (TPACK) framework. This framework emphasizes the synergy between technology, pedagogy, and content knowledge, which is crucial for creating meaningful learning experiences. Research has shown that effective technology integration enhances educational outcomes by fostering skills such as problem-solving, collaboration, and adaptability among students (Khan & Emara, 2018; Atabek, 2019). The TPACK framework serves as a guiding principle in selecting appropriate digital tools that not only engage students but also align with pedagogical goals.

In this context, tools like CoSpaces, Tinkercad, MakeCode, and micro:bit were chosen for their ability to scaffold learning through interactive and creative activities. For instance, CoSpaces allows students to design virtual environments, which enhances spatial reasoning and storytelling capabilities (Udvaros et al., 2023). Similarly,

Tinkercad provides a user-friendly platform for creating 3D models, thereby facilitating the understanding of geometric concepts and fostering creativity (Ng et al., 2022; Gökbulut & Durnali, 2023). The integration of MakeCode and micro:bit further supports entry-level programming and logical thinking, essential components of computational thinking that are increasingly recognized as vital for 21st-century learners (Cano, 2022).

Moreover, the strategic use of these technologies is embedded within the thematic framework of the project to create a dynamic and immersive learning environment. This approach aligns with findings that highlight the importance of active learning and the integration of multidisciplinary concepts in curricula (Hoque et al., 2022). By embedding technology into the learning design, students are provided with opportunities to apply theoretical knowledge in practical, engaging ways, enhancing both their creativity and technological fluency (Alshammari, 2023). The focus on interactive tools also addresses the need for educational institutions to adapt to the evolving landscape of technology in education, which has become increasingly vital in the wake of challenges such as the COVID-19 pandemic (Khan & Ali, 2023).

The integration of magic as a thematic framework in primary education is not merely a whimsical choice but a carefully designed pedagogical strategy. The magic emerges from the intentional alignment of advanced technological tools with the learning design, using their potential to create meaningful and engaging learning experiences. By combining technologies such as augmented reality, 3D modelling, and microcontrollers with thematic elements of wonder and creativity, this approach can captivate students' imagination while fostering essential skills. This careful design ensures that the magic of the experience is rooted in purposeful educational outcomes, where technology acts as a possible enabler for creativity, critical thinking, and emotional growth. Thus, the possible success of this approach lies in the synergy between innovative technologies and thoughtful pedagogy.

Research questions

How does the integration of a magic-themed project impact students' creativity and digital skills?

"The Magic in Me" can have the potential to significantly impact students' creativity and digital skills. By engaging students in imaginative tasks such as designing spells or creating virtual worlds, this thematic approach can foster an environment helpful to creative exploration and technological proficiency. Research indicates that the incorporation of modern technologies in educational practices enhances students' creativity and critical thinking skills, as it promotes innovative approaches to learning that encourage collaboration and problem-solving (Lubis et al., 2018). The interactive

nature of the project not only captivates students' imagination but also provides them with opportunities to utilize digital tools constructively, thereby improving their competence in navigating various digital platforms.

Furthermore, the magic theme can serve as a powerful motivator for students, encouraging them to engage more deeply with the learning process. The allure of magic can stimulate curiosity and inspire students to explore complex concepts in a playful and engaging manner. This aligns with findings that suggest integrating arts into STEM education enhances creativity and fosters a sense of joy and discovery among learners (Chung, 2014). As students immerse themselves in magical storytelling and hands-on activities, they are likely to experience increased motivation and participation, which can lead to measurable improvements in their problem-solving abilities and innovative thinking.

This question aims to explore how the imaginative and interactive nature of the project influences the development of creativity and technological proficiency in primary school students. It seeks to assess whether the use of digital tools and creative tasks, such as designing spells or virtual worlds, leads to measurable improvements in students' problem-solving abilities, innovation, and competence in digital platforms.

How does this approach contribute to personal development and emotional intelligence?

Engaging in creative tasks allows students to reflect on their emotions, strengths, and weaknesses, fostering self-awareness and empathy. Emotional intelligence is crucial for children's achievements as it supports their ability to navigate social interactions and manage their emotions (Acoci et al., 2022). The project encourages students to create personal artefacts related to their magical experiences, facilitating discussions about their meanings and promoting emotional reflection. This reflective practice can enhance students' emotional intelligence, equipping them with essential skills for personal growth and interpersonal relationships.

Moreover, the integration of emotional intelligence within educational frameworks is increasingly recognized as vital for fostering student engagement and success. Research has shown that emotional intelligence positively correlates with work engagement and academic achievement, highlighting the importance of providing learning experiences that nurture emotional development (Antonopoulou, 2024). By incorporating elements of emotional education into the magic-themed project, educators can create a holistic learning environment that supports students' emotional well-being and personal growth.

This question examines how the project affects students' personal growth, focusing on their ability to recognize and manage their emotions, empathy, and self-awareness. It also investigates whether the project encourages students to reflect on their strengths and weaknesses, promoting emotional intelligence through the creation of personal magic-related artefacts and discussions about their meaning.

Can such a thematic approach foster higher engagement and self-expression in young learners?

The thematic approach of magic, combined with project-based learning, also has the potential to foster higher engagement and self-expression among young learners. The immersive nature of magical storytelling allows students to connect with the material on a deeper level, encouraging them to express their thoughts and ideas freely. This increased engagement can lead to a greater willingness to participate in collaborative activities and share their creative outputs with peers. Studies have indicated that thematic learning environments enhance student motivation and self-expression as they provide meaningful contexts for exploration and discovery (Lee et al., 2022).

The hands-on activities associated with a magic-themed project can promote active learning, allowing students to take ownership of their educational experiences. This active engagement is essential for fostering a sense of agency and empowerment among students, which can lead to improved academic outcomes and personal development. By encouraging students to collaborate on magic-themed projects, educators can facilitate the development of teamwork and communication skills, further enhancing the overall learning experience.

This question aims to evaluate whether the magic theme, combined with project-based learning, increases students' motivation, participation, and willingness to express themselves. It seeks to measure engagement levels and self-expression as students immerse themselves in magical storytelling and hands-on activities, exploring how these elements contribute to a deeper connection with the learning process.

2. Materials and methods

Participants

The participants in this study consisted of a group of 63 primary students from Escola Sant Jordi, a public primary school located in L'Ametlla de Mar, Spain. The age range of the participants was between 8 and 10 years old, reflecting a typical cohort of students in the later stages of primary education. The school environment is characterized by a supportive and creative learning atmosphere with access to modern educational resources, including digital tools, which play a significant role in the learning process.

The selection process for participants was conducted through random sampling, ensuring that a diverse and representative sample of students was included in the study. This method was chosen to prevent selection bias and to capture a broad range of abilities and personal backgrounds. As such, the random selection allowed for an inclusive approach, ensuring that the sample represented the diversity of the student population in terms of interests, talents, and academic performance.

This random selection was deemed appropriate for the study's goals, as it enabled a holistic examination of how a magic-themed, project-based learning approach could impact creativity, technological proficiency, and personal growth across a varied group of young learners.

Informed consent was obtained from parents and guardians through a detailed meeting at the beginning of the school year, outlining the study's objectives, procedures, and confidentiality measures. Student assent was also sought using age-appropriate explanations of the project by the teacher.

Project overview

"The Magic in Me" was designed as an immersive, creative learning experience for primary students, integrating technology with storytelling and design. Over the course of the project, students were tasked with creating their own digital spells, designing virtual worlds in augmented reality, and crafting magic wands using a variety of technological tools. This approach combined creativity, technology, and hands-on learning to engage students in a meaningful way while developing key skills.

Students used CoSpaces to build and explore 3D virtual environments where they could create their own characters to express their thoughts and passions, bringing their magical ideas to life. Tinkercad was employed to design the digital models for their custom magic wands, which were 3D printed to create a physical representation of their creations. Additionally, students used micro:bit programming to add interactive features to their magic wands, such as lights or sounds, making the experience even more engaging.

A key aspect of the project was the integration of advanced technologies like augmented reality (AR) to enhance the learning experience. CoSpaces enabled students to experience their virtual worlds in AR, allowing them to "walk" through the environments they designed, also making their digital creations appear in the real world through mobile devices (tablets). When the students designed their magic wands in Tinkercad, the final step involved 3D printing, giving them a tangible artefact

to keep as reminder not only of their learning journey but also of the magical things all of them can do.

By merging these various technological platforms, the project offered students a comprehensive and innovative way to explore their creativity, improve digital literacy, and deepen their understanding of technology in practical, interactive ways. This thematic project not only fostered creativity and problem-solving, but also aligned with 21st-century learning goals by incorporating collaboration, self-expression, and technology integration into the educational experience of learning STEAM and English as a second language.

Learning objectives and assessment criteria

1. Discovery and development of individual talents:

Objective: To help students identify and explore their unique talents and passions.

Assessment criterion: Individual reflections on their abilities and the application of these in the project.

2. Integration of technology into learning:

Objective: To enrich the learning process through the use of technologies such as Tinkercad, CoSpaces, MakeCode, and micro:bit.

Assessment criterion: Autonomous use of technological tools in their projects.

3. Development of technological and digital skills:

Objective: To build competencies in programming, 3D design, and augmented reality design.

Assessment criterion: Quality and functionality of the technological projects created by students.

4. Application of mathematical concepts:

Objective: To implement strategies for counting, mental calculation, mathematical operations, and spatial awareness.

Assessment criterion: Accuracy and correct application of mathematical concepts in the design and programming of projects.

5. Stimulation of critical thinking and problem-solving:

Objective: To encourage students to apply logical reasoning and creative approaches to solve complex problems encountered in the project.

Assessment criterion: Evaluation of students' ability to identify problems, apply problem-solving strategies, and justify their solutions during the project development.

6. Fostering of teamwork and collaboration:

Objective: To promote cooperation and respect for the talents and opinions of others.

Assessment criterion: Active participation in group activities.

7. Development of social-emotional competencies:

Objective: To recognize and manage emotions in learning situations.

Assessment criterion: Reflections on emotional management and its impact on learning.

8. Encouragement of autonomy, initiative, and tolerance:

Objective: To develop autonomy and tolerance in the face of challenges and errors.

Assessment criterion: Ability to work independently and handle mistakes constructively.

9. Promotion of creativity and innovation:

Objective: To experiment with new ideas and express creativity.

Assessment criterion: Originality and creativity in the final projects.

10. Enhancement of communication skills:

Objective: To develop communication skills through project presentations.

Assessment criterion: Clarity in presenting projects to classmates and teachers.

3. Procedure

The project was conducted using a project-based learning (PBL) framework, which placed students at the centre of the learning process, encouraging active engagement, problem-solving, and collaboration. This approach allowed students to take ownership of their learning by engaging with real-world problems and applying their knowledge

creatively. The PBL framework was crucial in fostering creativity, technological skills, and personal development throughout the project.

Sessions overview

The project was divided into several key phases:

Introduction and exploration: Students were introduced to the concept of magic and technology integration. They explored the tools they would use, such as CoSpaces, Tinkercad, and micro:bit, through tutorials and guided practice. This phase allowed students to familiarize themselves with the technology before starting their creations.

Creation: In this phase, students designed their own digital spells, virtual worlds, and magic wands. Using Tinkercad, they modelled wands in 3D, while CoSpaces was used to build the virtual environments where their spells could take effect. For those integrating micro:bit technology, programming elements like sound or light were added to enhance the interaction. This phase encouraged creative freedom and experimentation with new ideas, while teachers provided guidance and technical support.

Collaboration and reflection: The project emphasized collaborative learning, with students working in small groups to brainstorm ideas, share designs, and give each other feedback. Each group member contributed their unique strengths, whether in design, programming, or storytelling. Peer feedback sessions were embedded within the creation phase, helping students to refine their work while also developing communication and teamwork skills.

Throughout the project, reflection played a central role in deepening students' understanding of their skills, personal growth, and emotional development. At various stages of the project, students engaged in guided reflection sessions, where they were encouraged to think about the progress they had made, the challenges they had encountered, and how they had overcome obstacles.

These reflective practices were structured around the following key questions:

What new skills did I learn or improve?

How did I handle challenges during the project?

What personal strengths or talents did I discover?

How did my emotions affect my work, and how did I manage them?

This process not only helped students track their learning progress but also fostered emotional intelligence, self-awareness, and resilience. By reflecting on their work, they

gained insight into their creative processes and technological skills, while also developing a sense of ownership and pride in their accomplishments.

Presentation: In the final phase, students presented their magic-themed creations to their peers and teachers. This included a showcase of their virtual worlds, a demonstration of their 3D-printed wands, and an explanation of how their digital spells worked. The presentation phase was a key opportunity for students to practice public speaking, articulate their creative process in English, and reflect on their learning outcomes. The planning and execution of the project can be seen in the following website QR.

Data collection

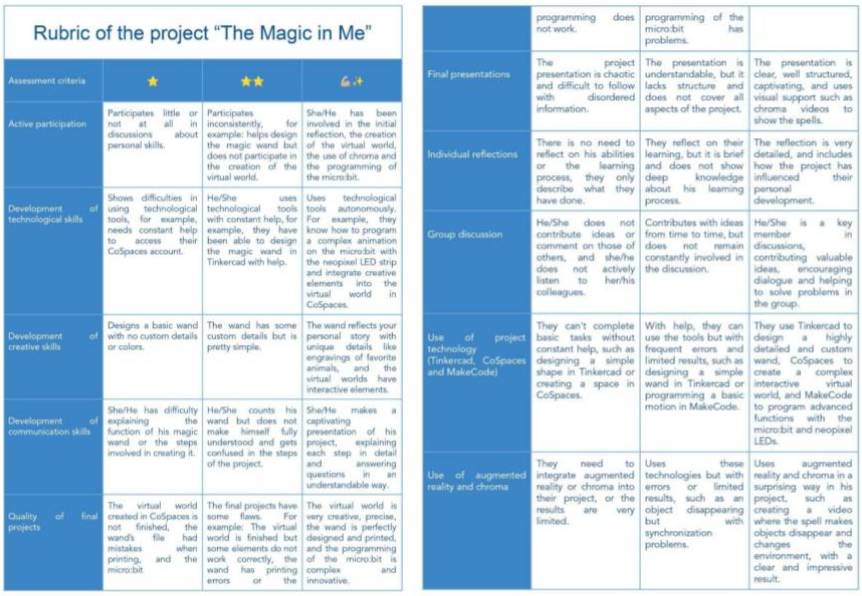
To measure the impact of the project on creativity, technological proficiency, and emotional growth, a mixed-methods approach was employed. This involved a combination of observations made by the teacher and the use of student surveys conducted at the beginning and end of the project to track changes in these key areas.

Methods

Observation: Throughout the project, teachers conducted systematic observations of student behaviour, engagement, and interaction during class activities following the rubric (Figures 1 and 2).

FIGURES 1 and 2

Assessment rubric



Rubric of the project "The Magic in Me"

Assessment criteria	★	★★	💪✨
Active participation	Participates little or not at all in discussions about personal skills.	Participates inconsistently, for example: helps design the magic wand but does not participate in the creation of the virtual world.	She/He has been involved in the initial reflection, the creation of the virtual world, the use of chroma and the programming of the micro:bit.
Development of technological skills	Shows difficulties in using technological tools, for example, needs constant help to access their CoSpaces account.	He/She uses technological tools with constant help, for example, they have been able to design the magic wand in Tinkercad with help.	Uses technological tools autonomously. For example, they know how to program a complex animation on the micro:bit with the neopixel LED strip and integrate creative elements into the virtual world in CoSpaces.
Development of creative skills	Designs a basic wand with no custom details or colors.	The wand has some custom details but is pretty simple.	The wand reflects your personal story with unique details like engravings of favorite animals, and the virtual worlds have interactive elements.
Development of communication skills	She/He has difficulty explaining the function of his magic wand or the steps involved in creating it.	He/She counts his wand but does not make himself fully understood and gets confused in the steps of the project.	She/He makes a captivating presentation of his project, explaining each step in detail and answering questions in an understandable way.
Quality of final projects	The virtual world created in CoSpaces is not finished, the wand's file had mistakes when printing, and the micro:bit programming does not work.	The final projects have some flaws. For example: The virtual world is finished but some elements do not work correctly, the wand has printing errors or the programming of the micro:bit has problems.	The virtual world is very creative, precise, the wand is perfectly designed and printed, and the programming of the micro:bit is complex and innovative.
Final presentations	The project presentation is chaotic and difficult to follow with disordered information.	The presentation is understandable, but it lacks structure and does not cover all aspects of the project.	The presentation is clear, well structured, captivating, and uses visual support such as chroma videos to show the spells.
Individual reflections	There is no need to reflect on his abilities or the learning process, they only describe what they have done.	They reflect on their learning, but it is brief and does not show deep knowledge about his learning process.	The reflection is very detailed, and includes how the project has influenced their personal development.
Group discussion	He/She does not contribute ideas or comment on those of others, and she/he does not actively listen to her/his colleagues.	Contributes with ideas from time to time, but does not remain constantly involved in the discussion.	He/She is a key member in discussions, contributing valuable ideas, encouraging dialogue and helping to solve problems in the group.
Use of project technology (Tinkercad, CoSpaces and MakeCode)	They can't complete basic tasks without constant help, such as designing a simple shape in Tinkercad or creating a space in CoSpaces.	With help, they can use the tools but with frequent errors and limited results, such as designing a simple wand in Tinkercad or programming a basic motion in MakeCode.	They use Tinkercad to design a highly detailed and custom wand, CoSpaces to create a complex interactive virtual world, and MakeCode to program advanced functions with the micro:bit and neopixel LEDs.
Use of augmented reality and chroma	They need to integrate augmented reality or chroma into their project, or the results are very limited.	Uses these technologies but with errors or limited results, such as an object disappearing but with synchronization problems.	Uses augmented reality and chroma in a surprising way in his project, such as creating a video where the spell makes objects disappear and changes the environment, with a clear and impressive result.

SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Special attention was paid to:

- Students' creativity in problem-solving and design tasks.
- Technological proficiency demonstrated through the use of digital tools like Tinkercad, CoSpaces, and micro:bit.
- Social and emotional interactions within group work, including collaboration, empathy, and self-expression.

Student surveys: Pre- and post-project surveys were conducted to measure changes in:

- Creativity: Students answered open-ended questions and selected responses related to their ability to generate new ideas and their engagement in creative activities.
- Technological proficiency: Questions focused on the students' confidence and abilities in using digital tools for creation (e.g., designing virtual worlds or 3D modelling).
- Emotional growth: Surveys included items related to self-awareness, emotional management, empathy, and personal strengths, helping gauge growth in emotional intelligence.

These surveys were designed to be age-appropriate for primary students, with a mix of multiple-choice questions, Likert scale ratings, and open-ended responses to capture qualitative insights. Here are the questions used:

Tools

- **Rubric**. A rubric (Figures 2 and 3) was designed to evaluate students' creativity and technology use based on criteria such as:
    - Originality of ideas in creating spells, wands, and virtual worlds.
    - The complexity of their designs in **Tinkercad** or **CoSpaces**.
    - Ability to code or integrate interactive elements using **micro:bit**.
    - Proficiency in creating virtual worlds with **CoSpaces**. The rubric included levels such as **beginner**, **developing**, **proficient**, and **advanced**, and teachers and students used this rubric during class activities and final project presentations.
- **Survey (pre-test and post-test).** To assess emotional development, the survey incorporated a range of items related to:
    - Students' recognition of their personal strengths.
    - Emotional responses to challenges (e.g., frustration, excitement).
    - Social skills such as empathy and collaboration within group projects. Teachers used these insights to track individual progress in emotional intelligence over the course of the project.
    - Students' ability to adapt or innovate in response to feedback during collaboration.

4. Data analysis

A combination of qualitative analysis and quantitative statistical techniques, the data analysis captured a holistic picture of how the project impacted student creativity, technological proficiency, and personal development. This mixed-methods approach ensured that both measurable outcomes and more complex emotional and cognitive growth were fully examined.

Quantitative analysis

1. **Survey data**. The pre- and post-test surveys were analysed using basic statistical techniques to identify shifts in student responses over time.
    - **Descriptive statistics**: Frequency counts and percentages were calculated for each multiple-choice and Likert-scale question. This

helped quantify the levels of improvement in areas such as **creativity**, **technological proficiency**, and **emotional intelligence**.

- **Paired t-tests**: Statistical tests were conducted to assess whether the observed changes in key areas like creativity and digital skills were statistically significant. This was particularly relevant for understanding whether students showed measurable growth in their confidence and abilities after the project.

2. **Rubric scores**: The rubrics used to assess the project were quantitatively analysed by calculating average scores across various categories.

Qualitative analysis

1. **Open-ended survey responses**: The open-ended questions in the surveys provided rich qualitative data about students' perceptions of their creative processes and emotional experiences. These responses were analysed using thematic analysis, where recurring themes were identified, coded, and categorized.
2. **Teacher observations**: Observations were analysed for recurring patterns, such as:
   a. Increased willingness to take creative risks.
   b. Growth in emotional self-regulation during group projects.
   c. The development of leadership and collaboration skills.

2. **Project presentations**: The final presentations of the students' projects were evaluated both quantitatively (using the rubric) and qualitatively (through teacher and peer feedback). The content analysis of these presentations, particularly how students reflected on their creative choices and technical processes, provided further evidence of their growth.

5. Results

A total of 63 students participated in the study, completing the rubric and both pre-test and post-test surveys. These tools evaluated areas such as creativity, digital skills, personal development, emotional intelligence, engagement, and self-expression.

Descriptive statistics

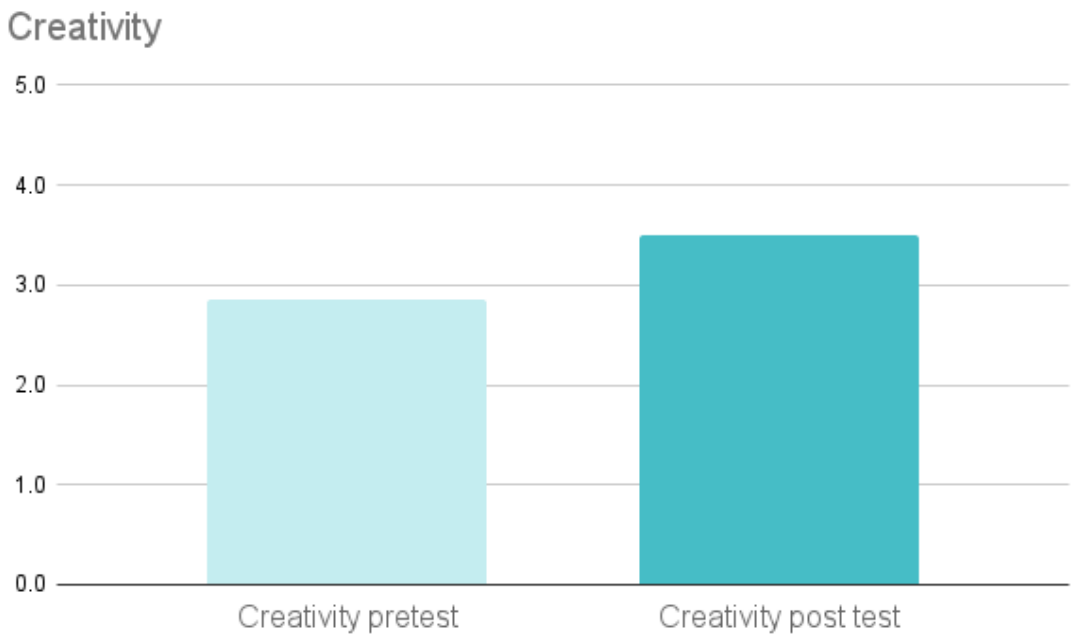
Creativity

The project led to notable improvements in students' creative engagement (Figure 4). Before the intervention, most students had occasional experience with creative activities such as creating stories, drawings, or games, with 63.5% responding "Sometimes", 25.4% selecting "Not really", and only 11.1% reporting frequent creative

engagement (“Yes, many times”). However, after the project, the percentage of students who frequently engaged in these creative activities surged to 50.8%, while the “Sometimes” group slightly decreased to 47.6%, and only 1.6% of students indicated “No”.

FIGURE 3

Results in creativity



SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Qualitatively, pre-test responses to creativity-related questions tended to reflect simpler ideas, such as “flying shoes” and “time machine”. By the post-test, students expressed more intricate and imaginative concepts like “flying dragon” and “magic book”, showcasing not only an increase in creative engagement but also a deeper level of creative thinking.

Digital skills

The use of technology for creative tasks saw an overwhelming increase throughout the project (Figure 5). Initially, 79.4% of students reported never having used a computer or tablet for creative activities like drawing or game development. Only 20.6% had done so prior to the intervention. Post-project, this dynamic had shifted dramatically, with 96.8% of students now reporting that they had used technology for creative purposes, reflecting a substantial development in digital skills.

In terms of confidence, pre-test results indicated that over half of the students (55.6%) were “Somewhat confident” in their digital skills, 25.4% were “Not confident at all”. and only 19.0% felt “Very confident”, After the intervention, 50.8% of students reported being “Very confident”, with only 9.5% remaining “Not confident at all”, showing considerable growth in both skills and self-assurance.

Linguistic performance

The project had a significant impact on students’ willingness and ability to share ideas. Before the project, an overwhelming 88.9% of students did not enjoy sharing their ideas with others, and only 11.1% were comfortable doing so. Following the project, there was a substantial shift, with 52.4% of students now reporting that they loved sharing ideas, 41.3% feeling comfortable with it, and only 6.3% still disliking the idea-sharing process.

This transition indicates not only an improvement in linguistic performance but also an enhanced ability and willingness to communicate ideas, suggesting that students became more confident and collaborative in their expression (Figure 6).

Personal development

The personal development of students showed marked improvements in several areas (Figure 7). Initially, only 39.7% of students reported knowing their special talents or strengths, while 33.3% were uncertain, and 27.0% thought they did. After the project, 52.4% of students reported being aware of their talents, with fewer students (14.3%) remaining unsure.

In terms of handling challenges, pre-test results showed that most students (55.6%) felt nervous or frustrated when faced with something challenging, and only 19.0% were excited about learning something new. By the post-test, 52.4% of students now felt happy and proud when working on difficult tasks, a significant increase from their earlier uncertainty.

Additionally, when working in groups, pre-test results revealed that 55.6% of students preferred working alone, and only 19.0% liked to lead and share ideas. Following the intervention, 52.4% of students expressed a preference for leading and sharing ideas in group projects, with only 6.3% now preferring to follow along.

Emotional intelligence

Students showed improvements in emotional awareness and empathy towards their peers (Figure 8). Before the project, 55.6% of students reported attempting to understand their classmates’ emotions, while 19.0% did not usually notice the emotions of others. After the project, the percentage of students actively trying to

understand how their peers felt increased to 63.5%, and the proportion of students who didn't notice others' emotions dropped to 12.7%.

These improvements highlight a greater level of emotional intelligence and social awareness, indicating that students became more empathetic and sensitive to the feelings of others during the course of the project.

Engagement and self-expression

One of the most substantial improvements was seen in the domain of student engagement and self-expression (Figure 9). Pre-test results showed that 55.6% of students were not very excited about starting the project, and 25.4% were not excited at all. Only 19.0% expressed some enthusiasm. By the end of the project, the number of students who were "Very excited" about the project had increased to 63.5%, with only 12.7% still reporting low levels of excitement.

Furthermore, before the project, most students were uncertain whether they would learn anything new (55.6%) or didn't think they would (25.4%). Post-project, 52.4% of students reported that they had learned new things, showing greater engagement and a more positive outlook toward learning.

In terms of creativity and problem-solving, the proportion of students who frequently came up with new ideas rose from 25.4% in the pre-test to 63.5% in the post-test. This underscores the project's impact on fostering a more open and idea-sharing environment, where students felt increasingly comfortable expressing themselves and contributing creative solutions.

Quantitative measures

Means and standard deviations

Digital skills

Pre-test

- Mean: 2.44. This indicates that, on average, students rated their digital skills slightly below the midpoint of the scale used (a scale of 1 to 5).
- Standard deviation: 0.19. This low SD evidences that most students' responses were close to the average, indicating relatively consistent perceptions of their digital skills.

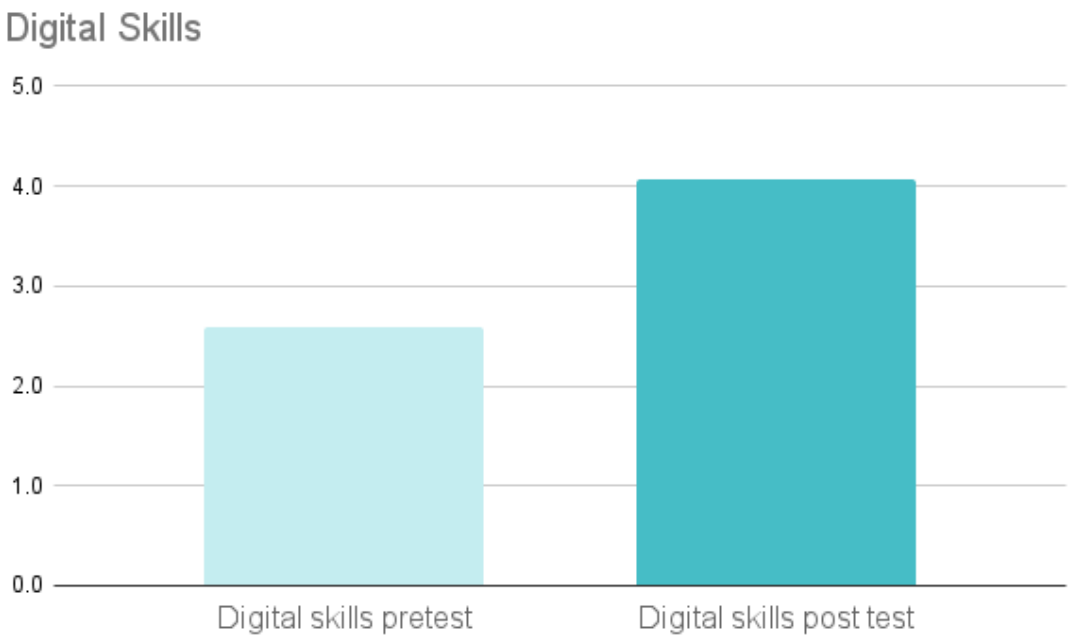
Post-test

- Mean: 3.90. This higher mean indicates a significant improvement in students' digital skills after the project.

Standard deviation: 0.33: This reflects some variability in the responses but most students rated their skills higher than before (Figure 5).

FIGURE 4

Results in digital skills



SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Linguistic performance

Pre-test

- Mean: 2.04. This indicates that students rated their linguistic performance just above the lowest point on the scale.
- Standard deviation: 0.03. This very low SD denotes that students' responses were very similar to each other's.

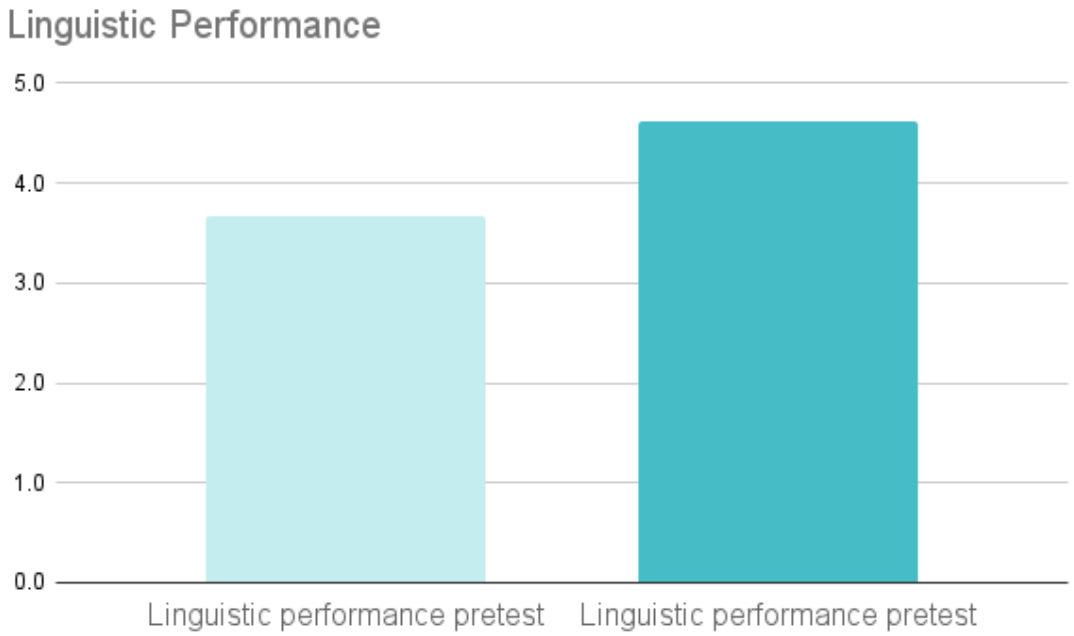
Post-test

- Mean: 3.71. This increase indicates an improvement in students' linguistic performance.

Standard deviation: 0.50. This reflects a moderate spread in the responses, indicating varied improvements among students (Figure 6).

FIGURE 5

Results in linguistic performance



SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Personal development

Pre-test

- Mean: 2.52. This average rating is slightly above the midpoint, indicating moderate confidence in personal development.
- Standard deviation: 0.35. This reflects some variability in students' responses, with a moderate spread around the mean.

Post-test

- Mean: 4.35. This high mean evidences a significant improvement in personal development.
- Standard deviation: 0.31. This indicates relatively consistent improvements among students (Figure 7).

FIGURE 6

Results in personal development

SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Emotional intelligence

Pre-test

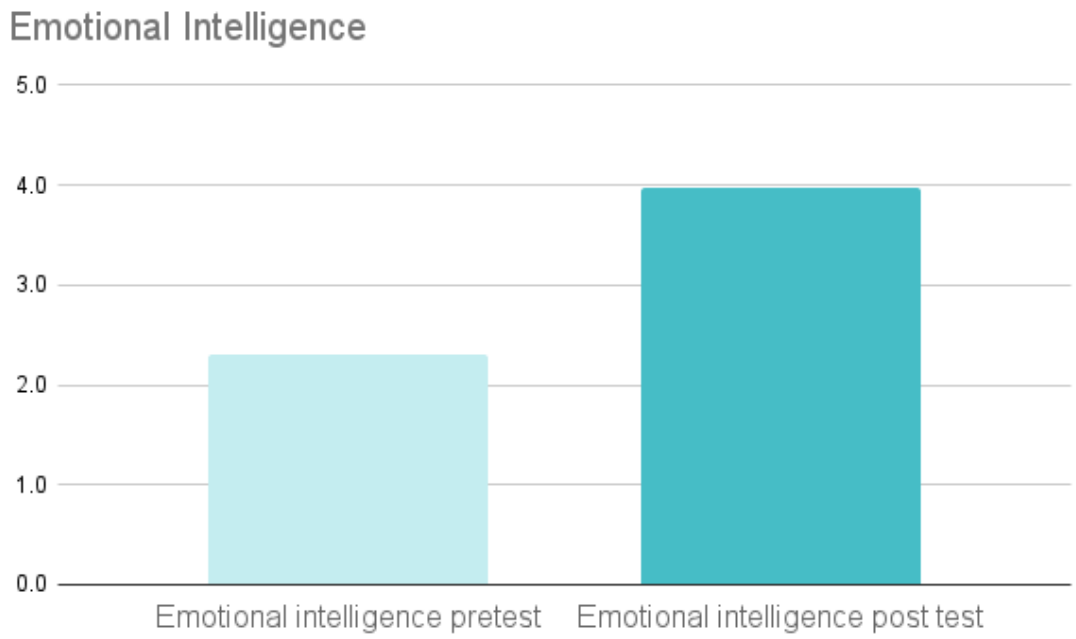
- Mean: 2.30. This indicates that students rated their emotional intelligence slightly below the midpoint.
- Standard deviation: 0.84. This higher SD reflects a wider range of responses, suggesting varied perceptions of emotional intelligence among students.

Post-test

- Mean: 3.97. This high mean denotes a significant improvement in emotional intelligence.
- Standard deviation: 0.00. This indicates no variability, suggesting that most students rated their emotional intelligence similarly high (Figure 8).

FIGURE 7

Results in emotional intelligence



SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Engagement and self-expression

Pre-test

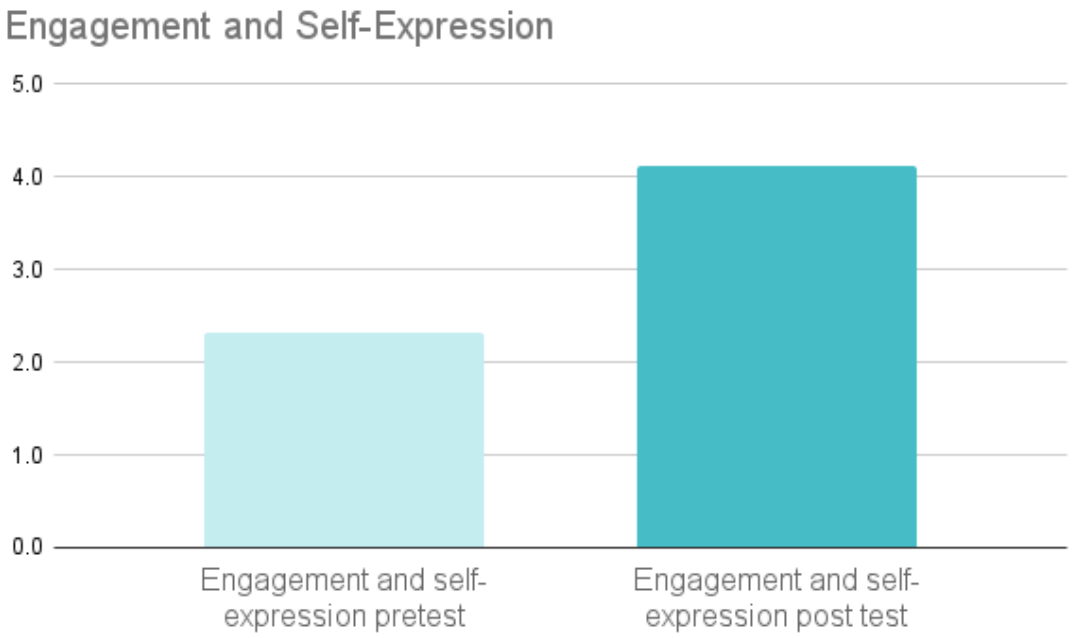
- Mean: 3.10. This indicates that students rated their self-expression abilities above the midpoint.
- Standard deviation: 0.00. This indicates that there was only one value or very little variability in the responses.

Post-test

- Mean: 3.76. This implies an improvement in self-expression abilities.
- Standard deviation: 0.00. This indicates that there was only one value or very little variability in the responses (Figure 9).

FIGURE 8

Results in engagement and self-expression



SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Statistical analysis

A paired t-test was conducted to assess the significance of changes between the pre-test and post-test scores. The results demonstrated statistically significant improvements in several key areas:

- **Confidence in using technology:** $t(62) = -12.65$, $p < 0.001$
- **Linguistic skills in English as a second language:** $t(62) = -13.74$, $p < 0.001$
- **Personal development:** $t(62) = -12.65$, $p < 0.001$
- **Empathy towards classmates:** $t(62) = -13.74$, $p < 0.001$
- **Awareness of special talents:** $t(62) = -16.13$, $p < 0.001$

Summary of findings

The project yielded significant improvements across multiple domains (Figure 10):

Creativity: The proportion of students frequently engaging in creative activities increased significantly, from 11.1% to 50.8%.

Digital skills: The use of technology saw a dramatic rise, with students' confidence in using digital tools growing as technology use surged from 20.6% to 96.8%.

Linguistic performance: The percentage of students independently creating stories, drawings, or games increased from 19.05% to 63.49%. Additionally, students who felt comfortable sharing ideas with classmates rose from 11.11% to 52.38%.

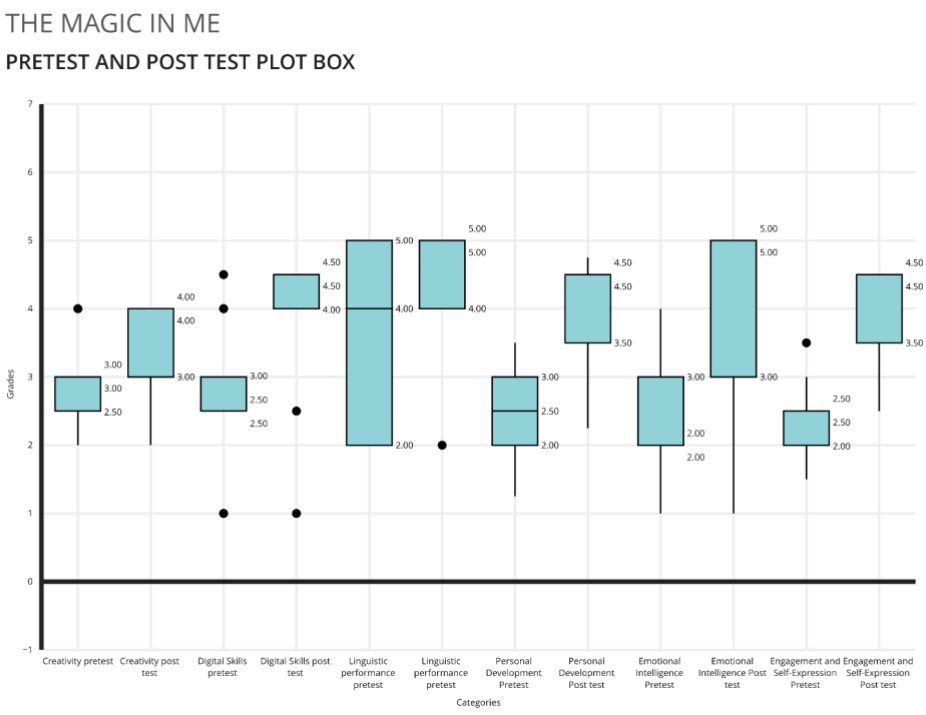
Personal development: A greater awareness of personal talents emerged, with excitement about learning rising from 41.27% to 52.38%. Confidence in tackling challenging tasks saw a substantial increase from 19.05% to 63.49%.

Emotional intelligence: Empathy toward classmates improved, with more students attempting to understand others' emotions, from 55.56% to 63.49%.

Engagement and self-expression: Enthusiasm for the project grew, with students excited about starting the project increasing from 19.05% to 63.49%. More students felt comfortable sharing their ideas, fostering a collaborative and enthusiastic learning atmosphere.

FIGURE 9

Pre-test and post-test plot box



SOURCE: ORIGINAL FIGURE BY THE AUTHOR.

Vercher Ribis, E. (2025). Fostering creativity, advanced technology, and personal growth: The impact of a magic-themed learning experience in primary education. *Revista Catalana de Pedagogia, 27*, 4-35. https://doi.org/10.2436/20.3007.01.215

6. Conclusions and discussion

"The Magic in Me" yielded significant improvements in students' creativity, technological skills, language skills and personal growth. By integrating a captivating theme with project-based learning and technological tools, the project provided a rich, engaging learning experience that fostered significant developmental gains in these key areas.

The findings from this project align with and expand upon existing research in several key areas: project-based learning (PBL), creativity in education, and the role of technology in primary education.

The success of "The Magic in Me" highlights the potential for thematic, project-based learning approaches to be adapted across various subjects and themes. By leveraging engaging and imaginative contexts, educators can create similarly impactful learning experiences in different areas of the curriculum. To implement thematic, project-based learning in their classrooms, educators can consider the following strategies:

1. **Selecting engaging themes**: Choosing themes that are both interesting and relevant to students. Thematic projects should capture students' imagination and connect with their everyday experiences. For instance, themes like "underwater exploration", "futuristic cities", or "mythical creatures" can spark curiosity and enthusiasm.

2. **Integrating technology thoughtfully**: Incorporating digital tools and resources that enhance the learning experience. Technologies like augmented reality (AR) and digital design platforms can provide hands-on experiences and make abstract concepts more concrete. Ensuring that technology use is purposeful and aligns with the learning objectives.

3. **Fostering collaboration and reflection**: Including opportunities for students to work collaboratively on projects and reflecting on their learning experiences. Group work can help develop social skills and teamwork, while reflective practices can promote self-awareness and personal growth. Encouraging students to share their ideas and learn from their peers.

4. **Encouraging creativity and choice**: Allowing students the freedom to explore and express their ideas creatively within the theme. Providing options for project topics or formats can accommodate diverse interests and abilities. This autonomy supports student engagement and fosters a sense of ownership over their learning.

5. **Assessing and adapting**: Using a variety of assessment methods to evaluate students' progress and outcomes. Formative assessments, such as observations and self-reflections, can provide insights into students' development and help educators adjust the project as needed. Summative assessments, such as presentations or final projects, can measure the overall impact of the thematic approach.

This study's emphasis on fostering creativity through thematic project-based learning aligns with findings by Hanif et al. (2019) and Lubis et al. (2018), who documented significant improvements in students' creative thinking and problem-solving abilities through PBL. Additionally, the use of tools like CoSpaces and Tinkercad echoes Usmeldi's (2019) results, which highlighted the role of digital tools in enhancing engagement and digital literacy in primary education. However, this study also expands on previous research by demonstrating how the integration of a highly engaging theme like magic can amplify these outcomes, offering not only academic but also emotional and social growth. Comparing these findings more explicitly with prior studies reinforces the unique contributions of this project, particularly its ability to combine imaginative, thematic elements with structured learning design to achieve holistic development. Future research could further explore how specific themes impact engagement and learning across diverse student populations, building on this foundation.

Limitations

Challenges faced during the project

One of the primary challenges encountered was managing the time allocated for the project. The intricate nature of creating digital spells, virtual worlds, and magic wands, combined with the need for detailed reflection and collaboration, often caused it to exceed the initially planned time frame. This limitation sometimes affected the depth of exploration and the thoroughness of the students' projects. The time constraints also impacted the extent to which students could iteratively refine their work and engage deeply with each phase of the project.

While technology was integral to the project, it also presented several challenges. Technical issues, such as software malfunctions, limited access to necessary devices, and varying levels of student proficiency with digital tools, occasionally disrupted the workflow. For instance, difficulties with CoSpaces or Tinkercad sometimes impeded students' ability to fully realize their creative visions. Additionally, ensuring that all students had equal access to the required technology was a logistical challenge.

Limitations in the study design

The study involved a relatively small sample size of students from a single school. This limited sample may not fully represent the broader population of primary students and could affect the generalizability of the findings. A larger and more diverse sample could provide a more comprehensive understanding of the project's impact across different educational contexts.

The study primarily focused on immediate outcomes and did not include long-term follow-up to assess the sustained impact of the project. Without extended observations or follow-up assessments, it is challenging to determine how the skills and growth achieved during the project might influence the students' future learning experiences or their continued development in creativity, technology use, and personal growth.

The data collected from student surveys and reflections may be subject to biases, as students might respond in ways they believe are expected or socially desirable. This can affect the accuracy of self-reported measures of creativity, technological proficiency, and emotional growth.

Future research

Future research should focus on evaluating the long-term benefits of thematic, technology-based learning, exploring its scalability across different themes and educational contexts, and incorporating a variety of technologies. These studies would contribute to a more comprehensive understanding of how such approaches can enhance primary education and support students' holistic development.

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