DIGITALEDUCATIONREVIEW

Exploring Tolkien's Literary Universe in the EFL classroom. Approaching Literature through Robotics-enhanced Inquiry-based learning

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ABSTRACT

This article examines how technology-enhanced inquiry-based learning (IBL) affected students' language acquisition and the evolution of motivation in the subject of English as a Foreign Language (EFL). Furthermore, this study presents a proposal for the collaboration of the subjects of Spanish and English, using translanguaging to establish connections between students' L1 and L2 and reducing curricular duplications. EFL presents itself as an opportunity for learners to engage with a broader scope of authentic resources, using Inquiry-Based Learning (IBL) as the main driving force of problem-solving situations. Thus, the investigation used Tolkien's literary world as the main theme and topic of research, and robotics (Ozobot), IBL and a gamified learning management system (Classcraft) as the main methodologies. Through a series of diagnostic and proficiency tests (which included a robotic-supported storytelling activity and an ARCS motivation test), quantitative data were gathered concerning the two analysed variables. Results indicated improved language acquisition and motivation in all four parameters. Furthermore, Ozobot showed to have a quick adaptation period for student use at basic levels of functioning, as well as aiding in creative storytelling. Results will contribute to closing the knowledge gap detected in EFL learning since has been mostly used for scientific learning.

KEYWORDS: Inquiry-based learning (IBL); English as a Foreign Language (EFL); Robotics; Literature; Classcraft

1 INTRODUCTION

Amid the 4th Industrial Revolution, the massification of access and creation of information has brought a new set of challenges to education. Within only a few minutes, not only can we be presented with thousands of results regarding a certain topic, but we can also be active participants in its creation and outreach. The internet has blurred the lines that separated traditional agents of knowledge, creating a heterogeneous, international and digital community of learners.

This shift in the way we interact with information has prioritised the need for critical thinking and management skills, which are also metacognitive strategies that have been linked to problem-solving abilities (McCormick, Clark, & Raines, 2015). These are highly valued skills in society and in the workplace, for the challenges faced are no longer dependent on pure knowledge, but on the managing, filtering, and creative usage of multiple sources of information in service of non-traditional environments (Willingham, 2008; Carlgren, 2013; Rejeki, 2017). In other words, there is an ongoing trend – mainly as the result of technological advancements – that is pressuring education to focus more on the how rather than the what of learning.

In this context, EFL presents itself as an opportunity for learners to engage with a much broader scope of authentic resources, using inquiry and research as the main driving force of problem-solving situations. Furthermore, by presenting language as the means through which students can research and learn about other topics, not only does Inquiry-based Learning (IBL from now on) increase opportunities for oral and written production and comprehension, but it does so while maintaining student's interest (Rejeki, 2017; Gómez Gutierrez, 2018).

On another hand, IBL has also been proven to be compatible and significantly improve results in electronic learning environments (Pedaste, Mäeots, Siiman, de Jong, van Riesen, Kamp, Manoli, Zacharia, & Tsourlidaki 2015), something which is of utmost importance if we take into account the causal relationship between technology and the need for critical thinking. In fact, the use of ICTs – especially regarding the introduction of robotics – has also been linked to the development of problem-solving skills and has led some to place the use of technology and the development of digital competence and computational thinking at the centre of political discussion regarding educational reforms (Vivas & Sáez, 2019).

Despite the possible connections and potential for the EFL classroom, many studies still focus on the introduction of technology-enhanced IBL through the STE(A)M fields (Permana, Parno, Hidayat & Ali, 2021; Pressley, Streit & McCartt, 2022) as it is closely related to the scientific method. This leaves behind its possible uses for many other areas of the curriculum such as language learning and literature, where Computer Assisted Language Learning (CALL) or Robotic-Assisted Language Learning (RALL) have yet to be fully explored.

An exploratory study is carried out under a mixed-method research approach, in which the case study was used as a research design since this "involves an inquiry process characterized by the

systematic and in-depth examination of cases of a phenomenon" (Bisquerra, 2009:309). Hence, the following study aims to fill the detected knowledge gap through the following research question: Can we analyse the effects on language acquisition and critical thinking of technology-enhanced IBL in an EFL classroom, using Tolkien's literary universe? To tackle this question, a threefold objective was set:

- To contribute to the filling of the knowledge gap regarding technology-enhanced IBL in an EFL environment.
- To experiment with the use of literary worlds creatively for language acquisition in technology-enhanced Inquiry-based Learning EFL classrooms.
- To explore motivation concerning literature through robotics and gamification in the EFL classroom.

The following research, carried out for two months in spring 2021 and thus, in a pandemic situation, also proved to be an opportunity for exploring another topic: interlanguage. It was carried out in a state high school in Valencia (Spain). The sample was composed of 19 students, most of them with an A1+ linguistic level of competence in the English Language. Nonetheless, some students presented higher proficiency due to language academies/private teachers. The subjects that lay within the linguistic field of the High School were Valencian, Social Sciences, Spanish, and English, which allowed the researchers to explore the curricular compatibility between the two latter, since they are normally seen as incompatible and, therefore, treated as such. For this reason, an additional objective was set for the study:

- To use literary worlds as a theme to connect different languages in Secondary Education.

2 LITERATURE REVIEW

2.1 Robotic-Supported Learning in the EFL Classroom

After reviewing several definitions of the term, we find that the one concluded by Ruiz Vicente (2017) best represents the potential in this matter:

> Educational robotics is a pedagogical creative process based on trial-and-error and as a technological process based on the interactions between science, society and technology, which are concreted in the construction, programming, and manipulation of a robotic platform.
>
> (Ruiz Vicente, 2017, p. 58)

This author also continues to argue that, despite the lack of reliable studies on the subject, several benefits have been constant throughout the current literature: (1) academic achievement, (2) interest and motivation, (3) social abilities and cooperative work, (4) creativity, and (5) development of problem-solving skills (p. 35). However, technology does not necessarily imply learning – as neither does any other tool – without taking into account the context or methodology it is set in: age of students, the role of the robot, teaching strategies… (Engwall & Lopes, 2020; Alimisis, 2012). In fact, studies have shown that, without the correct amount of guidance and support to encourage scaffolding, students develop "avoidance" motivation, reducing its beneficial outcomes (Daniela & Lytras, 2019). For this reason – and as stated by Asiri, et al. (2021) – teachers should adapt the technology used to the instructional process and social context at hand, hence creating meaningful learning environments that can improve students' 21st-century cognitive skills. Several authors, such as Alimisis & Kynigos (2009, p. 17) or Altin & Pedaste (2013) differentiate the use of robotics into two categories depending on its pedagogical objective: (1) Robotics as a learning object and (2) Robotics as a learning tool: this category includes activities that use robots to address a topic other than itself (Alimisis, 2013; Benitti 2012).

Nowadays, there is a wide range of educational robots that can support many different aspects of language learning. These mainly fall into two categories: they can either be social robots or non-social robots: teachers need to research and choose the robot which best matches their objectives. Moreover, they must take into consideration the advantages and versatility that they may provide when placed in different pedagogical roles: teaching assistant, tutor, peer/partner/opponent/tool, learner, and social companion (Engwall & Lopes, 2020). Based on the previous observations, this study will use Ozobot, a non-social robot– used with its corresponding student-robot hierarchy – due to the great potential detected in this field of educational robotics and the several advantages they present in comparison to social robots. There are mainly two versions of the Ozobot in the market: Bit and Evo. As the following intervention was going to be the first contact the students had with an educational robot, the more advanced options and uses of Ozobot Evo were not deemed necessary. Furthermore, the principles through which both of them function are the same: Ozobot is a small, simple, yet versatile non-social robot based on colour-code programming. Tiny sensors and downward-facing cameras allow it to detect and follow lines, while a rapid changing sequence of colours can be used as codes to control its movements and actions. It also has the option to control it digitally via block-based programming, so you can adjust to the students' computational level (from the first years of kindergarten up to university). This allows Ozobot to be perfect for heterogeneous classes and several grades.

The following uses have been detected with the Ozobot Bit in the EFL classroom:

- Ozobot as support to storytelling: its numerous functions (such as controlling its speed, lights, movements, or sounds) make this robot especially useful to support storytelling, as you can create a circuit – which would represent the flowing of the story – highlighting different parts of the tale through images or special moves/codes. In other words, the Ozobot would represent the narrator, or the main character advancing through the story, passing the main events (represented by pictures) and engaging with them. This would act as visual support for the listeners while a person reads the story out loud, making it an audio-visual experience. This storytelling circuit and reading will be the final project students will have to present at the end of the didactic proposal.
- Ozobot as a learning activity: this use of the Ozobot implies less degree of creativity than the latter, but it is still a very powerful tool to support learning. By creating a circuit with pre-established images or actions, you can work on several aspects of language learning such as grammar, vocabulary, literature, or even syntax. An example of this is also shown in the didactic proposal created for this research, where each image or prompt is assigned to a space where the student must fill in an appropriate code. Furthermore, Ozobot learning activities allow the student to progress at their own rhythm and receive immediate assessment, as its moves will indicate

whether the student has completed the activity correctly or not.

- Ozobot as a storytelling prompt pre-made circuits – both with fixed and random outcomes – are a very useful tool to prompt stories. Instead of writing the story first and then designing a course for the Ozobot, it is this one who determines the outcome, context, or the main actions that happen within, leaving the students to imagine the storyline that connects all of the different elements.

Despite the several uses that teachers can make of the Ozobot, only those that are directly connected with language learning are mentioned, as it is the objective of this study to research the impact of robotics in the EFL classroom. However, it is important to highlight that there are many more uses as a learning activity that go beyond purely linguistic elements, such as explicit problem solving, computational thinking, coding, creativity and game design.

Regarding the S-R hierarchy and the role of robotics, we observe that in the first two uses, the Ozobot is placed under student control and acts as a tool; however, the latter use presents a different case: when acting as a prompt, it is the robot that determines student action, placing it, therefore, above student control. Moreover, this use presents a new role for robots, as it does not fit within the existing tutoring/teaching assistant role (it does not fulfil the purpose of a teacher, since it cannot give feedback or verbally guide a learning activity).

Despite the potential benefits of educational robotics and the positive perception of students, families, and teachers, several studies still show that the main barrier for their introduction is the teacher's lack of preparation and knowledge and a series of misconceptions about the robot's uses (Jurado et al., 2020; Ruiz Vicente, 2017; Alimisis, 2013).

2.1.1. Cognitive theories behind robotics

The use of robotics in the classroom as a tool to support learning is closely related to the constructionist, constructivist and social constructivist theories, as it places the student at the centre of his/her own learning. Piaget & Infelder (1975) discuss the importance for learners to manipulate objects to promote their learning and cognitive development: in this sense, robots present a clear advantage over virtual platforms or other forms of technology (van den Berghe et al., 2019). Through interactions with objects, they can "learn in an active and playful way by building objects and experimenting with abstract concepts in a significative and functional manner" (Vivas & Sáez, 2019, p. 109). In the case of Primary education, where children begin to develop logical reasoning regarding concrete physical reality, robotics presents itself as a useful tool to address their cognitive development through manipulative and collaborative problem-solving activities (Ruiz Vicente, 2017; Vivas & Sáez, 2019). In fact, the programming language in educational robotics is highly logical and intuitive, and over the past years, many different options adapted to multiple levels of coding difficulty have arisen (e.g. block-based programming or colour-code programming). Finally, and as stated previously, the use of robots creates ideal environments to work cooperatively, since learners must interact with each other and with the robot, discuss, and solve problems to complete the different tasks.

2.1.2. Motivation and Robotics

Many studies that have addressed the topic of robotics have also highlighted the positive effects it produces on students' motivation and interest – mainly regarding the STE(A)M fields. Ruiz Vicente (2017) names only but a few types of research that have found robotic programs directly related to students' likelihood of studying science or engineering degrees in the future, such as the one carried out by Ruiz del Solar and Avilés, (2004, as referenced in p. 37), where 84% of the 700 participants in an educational robotics program said they would consider enrolling in the STEM fields at university. This increase in motivation, as stated previously, can also be used in other areas other than the STEM fields. Johnson (2003, p.19) pointed out that "robotics is an edutainment [educational and entertaining] medium par excellence"; in other words, it teaches at the same time it entertains, making it a versatile tool applicable to other subjects. This increase, in turn, has also been linked to a reduction of social exclusion and dropping out when applied in general curricular environments, whilst having the opposite effect if applied as an extracurricular subject; hence, educational robotics also becomes a means for inclusion (Daniela & Lytras, 2019).

Nonetheless, recent research has shown that this increase may be due to the "novelty" factor robots imply, which only have short-term results in motivation. Pop culture has put robotics under the spotlight amid a technological era; that and the fact that it is a manipulative educational tool, produce an initial burst of motivation that rapidly declines as students get more used to it (Ruiz Vicente, 2017; Kanda et al., 2004). Teachers need to make the most of this initial push and maintain the momentum it generates by using robots intermittently, with different styles of activities that include a creative component. As with any other tool, the objective is not to burn them out by using them excessively in the first few classes, but rather introduce them when needed without forcing their appearance in every activity. This way, you can extend the "lifetime" of the novelty factor and slowly integrate them in the classroom.

3 METHODOLOGY

3.1 Context of the intervention

The following research was carried out in a state high school in Valencia (Spain). The sample was composed of 19 students – 12 boys and 7 girls – aged 12 and 13. Regarding their English proficiency, the group had mainly acquired an A1+ level of competence based on class observations, teacher assessment, and the material worked with. However, some students presented higher proficiency due to language academies/private teachers.

3.2 Structure of the intervention

The didactic proposal was the first inquiry the students had done so, it was decided to use a Structured Inquiry Model (Stavier and Bay, 1987) to ensure a guided scaffolding (Suárez et al., 2018) and motivated students. The theme revolved around exploring Tolkien's literary universe, using concepts that appear in The Silmarillion (1977), The Hobbit (1937), and the trilogy of The Lord of the Rings (1954) to work on storytelling and narrative. To do so, 3 research lines were set to attend to student's personal interests and language level (Luke, 2006):

- The line of the Ainur: in this research group, students would be able to learn about the main spiritual creatures and deities in Tolkien's Universe.
- The line of the Elves: students in this group would learn about the importance of the Elves, their characteristics, and where they live.
- The line of Middle-Earth: this research group mainly followed the storyline of The Lord of the Rings, learning about the rings of power and the history of Middle-Earth. This line was recommended for those students with no prior knowledge of the universe, as it also had simpler research questions.

By the end of the intervention, students from different research groups would get together and make smaller teams, known as The Fellowships of the Ring. Together, they would have to complete a final activity that needed an expert on each topic, as it would include questions that only one of them could answer. This was done for students to share what they had learnt in their research, as it is part of the Discussion phase: Communication.

Despite a few differences between the different research groups (based on the personalisation criteria), learning materials included short clips from the films, adapted fragments from the books, and several websites that included information regarding the characters or other elements of the stories (related to the Objective 2 of this research: to use literature creatively for language acquisition in technology-enhanced Inquiry-based Learning EFL classrooms (Alameddine & Ahwal, 2016). On the other hand, the tools used to carry out the intervention included Classcraft – a gamified Learning Management System, Ozobot – a robot-supported learning tool, and HTML5, as the three resources complemented the project's theme and allowed for a more creative and motivational environment (related to the Objective 3: to explore motivation concerning literature through robotics and gamification). The use of Ozobot in the EFL classroom, the robotic tool chosen for this study was an innovative initiative of our design.

Finally, the didactic proposal was carried out in the subjects of Spanish and English, making use of linguistic concepts common to both languages – determined by the teacher's prior programming – and analysing student's interlanguage skills (related to the Objective 4: To use literature as a theme to connect different languages).

The introduction video to the Didactic proposal can be visited in the following QR code.[1]

3.3 Materials

Students were equipped with an individual Chromebook (provided by the high school) to carry out the sessions. Additionally, these other tools were used:

- Classcraft is a gamified Learning Management System where students can create their own avatars and gain experience points through class participation and completing Quests. These experience points can then be used to level up their characters and further customise them. For this intervention, three worlds were created – one for each research group. Within each world students had the same number of Quests, which followed the following structure:
    - Story: this part of the Quest was used to create a fictional story where the activity was going to take place (Orientation phase). In this case, students were told that they had to train and learn from their culture (humans, elves or ainur) to beat Sauron. At the same time, a small research question was placed (Conceptualisation phase of the IBL methodology) with a link where they could find the information needed. This was done to guide students through the Investigation phase, getting them used to surfing the internet and working on specific written comprehension skills (finding selective information).
    - Task: here, the teacher explained the task/activities that the students had to complete in addition to the inquiry. The tasks were the same for all the research groups and their objective was to work more specifically on the linguistic concepts that were being addressed (the students uploaded their tasks through the LMS of the school: Aula Virtual).
    - Discussion: Finally, there was a discussion board where students had to post the answers to their research questions. Points were not given if students had not answered or if they had copied the information, but they were rewarded if they had answered with their own words.
- HTML5 is a royalty-free programming language that allows people to create interactive multimedia content without using additional software. From an educational point of view, it is an incredibly useful tool, as it allows teachers to create all kinds of engaging tasks: from interactive books with activities and tests to memory games and virtual 360º tours. Moreover, it is compatible with Moodle and, therefore, respects students' information privacy. In this intervention, HTML5 was used to design all of the activities and theoretical explanations, for the class did not use any books in Spanish and in English.
- Ozobot: Taken into consideration the methodology at use and the context in which the Didactic proposal is set up, Ozobot is presented as an aid that will enhance students' experience, as its easiness of use and versatility will focus attention on the matters at hand (rather than the robot itself). Furthermore, the Ozobot will serve only as a learning activity and support for

[1] https://youtu.be/qSkG11moXRA

storytelling in this intervention (both roles placing the robot under the control of the student). The reasons for this are: these roles allow them to work directly on the pedagogical objectives set, they promote the creative use of robotics, and they let the students experience the main functions of the robot and have a feel of its potential.

3.4 Description of the intervention

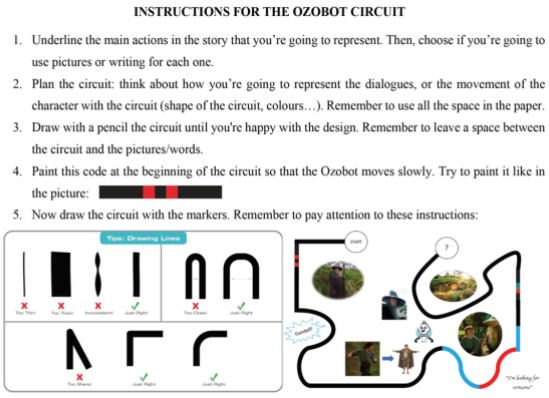
The first session started with a small presentation of the Didactic proposal and the theme that was going to be developed throughout. We talked about Tolkien and discussed their previous knowledge of him and his work. After, a structured inquiry process about Present Continuous was started. This initial research closely followed the inquiry cycle (Pedaste, et al., 2015) activating prior knowledge (Orientation), questioning and hypothesis building (Conceptualisation), researching information, testing the hypothesis – reformulating it if need be – and result interpretation (Investigation), conclusions (Conclusion), and reflection (Discussion).

- Orientation: inspired by the KWL chart of Ogle, (1986), the students were guided through three questions that aimed to recover previous knowledge, work on metacognition, and develop inquiry skills respectively: What do we know about the topic? / What more do we need to know? / How and where can we find that information?
- Conceptualisation: with the information gathered, the students created sentences in Present Continuous (only in affirmative) as a representation of their hypothesis of how this tense would be constructed.
- Investigation: A PowerPoint presentation with several examples of sentences in Present Continuous was shown. Initially, these sentences did not include any kind of grammar hints or information; however, little by little they were asked if they could find any patterns. This was done to guide their scaffolding through the most challenging phase of the inquiry cycle.
- Conclusions: the students guided the teacher into writing the full grammatical rules of Present Continuous, as a way of summing up the results of their small research, which easily led up to the next phase:
- Discussion: as it was a whole class inquiry, there was no need for a communication phase, so the group moved directly to reflection. Through a class conversation, they went over how they had learnt about the topic and the different steps we took.

As homework, students had to complete the 1st Quest in Classcraft, consisting of a small Structured inquiry and an interactive HTML5 video.

The first half of the second session was dedicated to explaining Classcraft and getting the students to log online and create their avatars. This was done to ensure that they would all be able to work with the platform from home, as their homework would be handed out through there. The second half consisted of following the same inquiry process as in the English class but with Connectors. In this case, a True or False activity in HTML5 was used as a baseline to build our hypotheses: students would build their ideas/answers and discuss them with the class. The information for the research was provided through an interactive book. The third session started with a reading used to review the verbal tenses at stake. This text was also used as a gateway to introduce connectors in the English language. Then, the group had a small discussion reflecting on interlanguage and how some languages shared common concepts (mainly through examples in English, Spanish and Valencian). For the remainder of the class, students had to complete Quest 2 in Classcraft, which again consisted of small research – different for each group – and three activities based on the connectors used in the story.

Session 4 (in English) was focused on a gradable written and oral comprehension practice, as the end of the term was near and the teacher-researcher was asked to design both exams. To do so, two HTML5 activities were planned, still focusing on Tolkien's Literary Universe and on the two concepts that had been explained previously. In the following session, the students had a small test through a "Boss battle" in Classcraft. Finally, students were handed out an Ozobot written comprehension activity. An extract from *The Lord of the Rings* was used so that students could answer multiple-choice questions. Each answer had an Ozobot code assigned to it, which they then had to paint over a map: if they had answered correctly, the Ozobot would go through the circuit perfectly; if not, the Ozobot would go to a dead end. Session 6 (in English) was used as a Writing Workshop, where students were asked to write a short story revolving around Tolkien's Universe, using only Present Simple and Present Continuous. During the next session, the story would be transformed into an Ozobot circuit similar to the one carried out in the pretest. To do so, a small list of instructions to follow was created (see Figure 1 below). After explaining these instructions, students started to work autonomously. Once a student had finished designing the circuit, the teacher would lend them the Ozobot to test it and make any necessary adjustments. Then, when they were ready, they would call for the teacher and recite their story together with the robot; in other words, there was an individual assessment a feedback process.



INSTRUCTIONS FOR THE OZOBOT CIRCUIT

1. Underline the main actions in the story that you're going to represent. Then, choose if you're going to use pictures or writing for each one.
2. Plan the circuit: think about how you're going to represent the dialogues, or the movement of the character with the circuit (shape of the circuit, colours…). Remember to use all the space in the paper.
3. Draw with a pencil the circuit until you're happy with the design. Remember to leave a space between the circuit and the pictures/words.
4. Paint this code at the beginning of the circuit so that the Ozobot moves slowly. Try to paint it like in the picture:
5. Now draw the circuit with the markers. Remember to pay attention to these instructions:

Figure 1. Instructions for circuit design.

3.5 Data gathering tools.

The present study has used mixed methodology research (Bisquerra, 2009) utilizing a combination of formal and informal data-gathering tools to obtain both qualitative and quantitative data. Amongst the formal tools of assessment, we find the use of diagnostic and proficiency/development tests to collect information regarding the use of English, digital competence, creativity, and motivation; whilst the informal tools of assessment have been based on direct observation and self-assessment, collecting

qualitative information regarding responses, feelings, or other thoughts and emotions of both students and the teacher.

- Diagnostic test: during the week before the beginning of the intervention, students were asked to come to a separate classroom, where a small storytelling test was going to take place. The idea behind this activity was to assess three variables through a rubric: students' English language level when applied to the story creation and narration (1), their digital competence (2), and their creativity in the story and their use of the Ozobot (3). This online rubric is available at https://forms.gle/YVsZEiGfAGHvY9T4A
- Proficiency test: on the last two full days of the intervention, students were asked again to create a short story using only Present Simple and Continuous. In this case, the story had to include elements from Tolkien's Literary Universe specific to their own research group. After they had the story planned out, they had to create a circuit for the Ozobot representing the actions that occurred in their story visually (either words or pictures). As with the previous test, three variables were going to be measured through the same rubric: students' English language level when applied to the story creation and narration (1), their use of sequencing connectors (2), and their creative use of the Ozobot (3). These measurements were made to analyse whether the students had improved after the intervention in those three areas.
- Diagnostic and development motivation questionnaire: to study the effects of the Didactic Sequence on students' motivation, two tests were created in Google Forms for them to fill out at the beginning and at the end of the intervention. These tests included all the questions in English and in Spanish to ensure students' comprehension; however, they were both carried out in class in case there were any questions or problems. Furthermore, they were created based on the ones used by Hong et al. (2016), as it structures motivation into a multivariable analysis of Attention, Relevance, Confidence and Satisfaction. The pretest consisted of 15 questions, whilst the posttest had a total of 20 questions. This is because the latter also included a few more questions regarding the use of the Ozobot, their predisposition to reading Tolkien's work, and a small teacher evaluation regarding future changes and the quality of the explanations through Inquiry-based Learning. The Diagnostic Motivation Questionnaire can be found at https://forms.gle/YY9FvtZrwKrsng2N7 and the Development Motivation Questionnaire at https://forms.gle/xMgLKeqsDuMuFqtJ8
- Direct observation: research journal. During the intervention, the teacher kept a written and audio diary documenting every aspect of the sessions carried out. This included the planning process (schedule, initial structuring of the sessions, methodology, modifications, material creation, and time spent), the intervention itself (attendance, class structure and time spent on each area, problems and real-life changes, and student's reactions and questions), and a latter assessment regarding the implementation (feelings towards the development, meeting of expectations, problems and strengths, and comments/recommendations made by the tutor after seeing the session).

4 RESULTS AND DISCUSSION

4.1 Diagnostic and Development Motivation Questionnaire

To quantify and compare the results obtained in the Motivational ARCS Tests, a value from 1 to 4 for each possible answer was assigned, where 4 represents the highest motivation value and 1 represents the lowest. Then, the average each student scored in each of the ARCS sections was calculated (see Table 1 below).

Motivational Categories		Initial Questionnaire	Final Questionnaire	Variation (%)
Attention	Total	3.43	3.58	+4.37%
	QHC2: The materials used in the English class are boring and don't call my attention.	3.36	3.68	+9.65%
Relevance	Total	3.13	3.4	+8.63%
	QHC: I would like to have more freedom in the English classes to choose what I want to learn.	2.21	3.36	+52.41%
Confidence	Total	3.26	3.29	+0.92%
	QHC: I feel confident about my learning after the English class.	3.31	3.36	+1,76%
Satisfaction	Total	3.32	3.5	+5.42%
	QHC: I feel motivated and I have a sense of achievement after each English class.	3.26	3.42	+4.64%

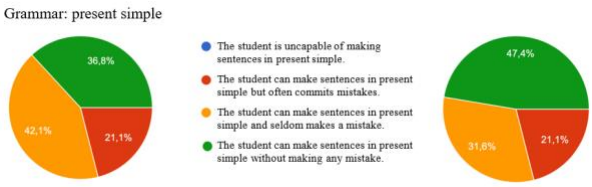
Table 1. Results ARCS Motivation test

[2] QHC: Question with the Highest Change between pretest and posttest.

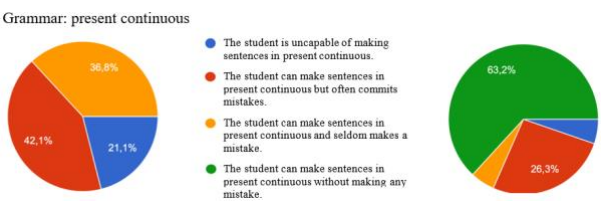
Despite the increase in every variable, results do not show a significant change in students' motivation after the intervention. One reason for the no change in motivation is that the intervention was conducted for a short period of time since motivation develops quite slowly. However, this is most likely due to the high pretest scores (all above 3.1), as their current English teacher already incorporated the use of student-centred methodologies and ICTs – including digital tasks, interactive online activities, or even virtual reality. Further research would be needed to analyse the changes experienced in a group with a more traditional methodological background. Notwithstanding, these results coincide with the ones obtained in previous studies, both in technology-enhanced IBL (Chang et al., 2016; Suárez et al., 2018; Becker et al., 2020) and robotics (Johnson, 2003; Ruiz Vicente, 2017), confirming their efficacy in increasing language learning motivation. The most significant increment was experienced in the variable of Relevance, specifically regarding the student's freedom in the choice of content. Initially, this aspect was scored with a 2.21 (meaning that students desired more freedom, as motivation in that sense was low), but by the end of the intervention, the score climbed to a total of 3.36, which represents an increase of 52,41%. These results could be explained due to the creation of the three lines of research (Middle-Earth, Elves & Ainur) where, despite having a controlled evolution of the contents and materials used in every stage (Structured inquiry), students had a sense of freedom and choice in what they wanted to learn in-depth: individualisation in IBL (Luke, 2006). On the other hand, there was a question that experienced a significant decrease concerning the diagnostic test, which was also experienced in this variable (Relevance), specifically when asked about the matching of interests with the topic at hand: Tolkien's Literary Universe. As it was later confirmed through a series of conversations with the students, this subject fascinated some while being indifferent or too complicated for others. This variation resulted in a drop in motivation of 8.39%. However, it is important to highlight that a poll was done to evaluate students' likeliness to read Tolkien in the future. In fact, two students decided to read the first book of *the Lord of the Rings* as their mandatory Spanish reading for the 3rd term.

4.2 Diagnostic and proficiency storytelling test

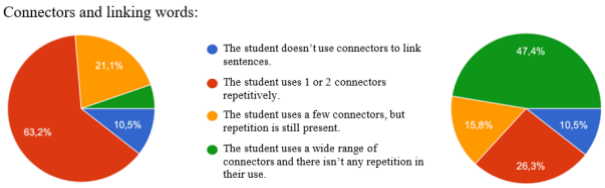
Regarding the results obtained in the diagnostic and proficiency storytelling tests three separate areas were measured: use of English, creativity, and digital competence (see graphics 1 to 3)



Graphic 1: Present simple use in the diagnostic and proficiency storytelling test.



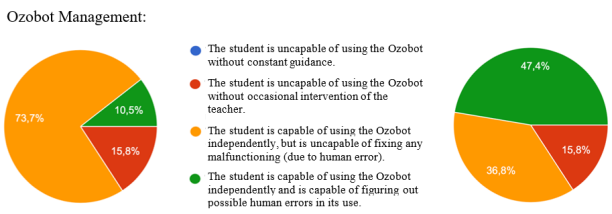
Graphic 2: Present Continuous use in the diagnostic and proficiency storytelling activity.



Graphic 3: Connector use in the diagnostic and proficiency storytelling activity.

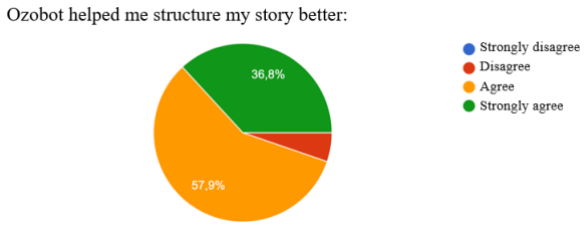
All dimensions of the use of English significantly improved as a consequence of the intervention, especially those regarding the use of present continuous and sequencing connectors (which were the contents set out to teach during the intervention). However, students also further secured correct present simple use, despite not addressing it directly, rising from 36,8% to 47,4%. Regarding the two main linguistic concepts of the didactic proposal, correct use of present continuous increased 63,2%, while decreasing its incorrect use in all other stages. The incorporation of varied sequencing connectors, on the other hand, rose from 5,2% to 47,4% (an increase of 42,2%), while also improving results at other stages of learning. These results show that technology-enhanced IBL is a useful methodology through which to incorporate and introduce new linguistic contents in the EFL classroom, tackling them both explicitly and implicitly. Furthermore, the use and explanation of sequencing connectors have been tackled from both the Spanish and the EFL classroom, showing, not only the curricular compatibility of both subjects through the use of interlanguage but also the inherent benefits of content-sharing, such as time-saving and establishing connections between students' L1 and L2. In this aspect, the closest study to which these results can be compared to is the one carried out by Gómez Gutiérrez (2018), as she also used translanguaging in an IBL environment. However, her study focuses on the use of L1 within the EFL classroom, while the present study suggests an improvement in language learning as a consequence of collaboration and interconnection between the two subjects. This opens a new line of research that future studies can address more directly.

In addition to its learning potential and effect on students' motivation, another important aspect to take into account when introducing new educational technologies is the students' digital competence and the period of adaptation to its use. As explained previously, Ozobot is an educational robot that has several levels of complexity, so it can be adjusted to different stages of digital competence. This adaptability and easiness of use in its most basic functions, allowed students to gain quick semiautonomous control of the Ozobot, even after only a short explanation during the pretest (scoring up to 73,7% and no incapability of use without constant guidance). Furthermore, during the intervention, students gained significant autonomy in its control and management, moving up from 10,5% of complete autonomy to 47,4% (see Graphic 4 below). This increase shows its quick adaptation period during the initial stages and using only its basic functions; however, further research should be carried out to test the evolution of digital competence with more complex uses of the robot.

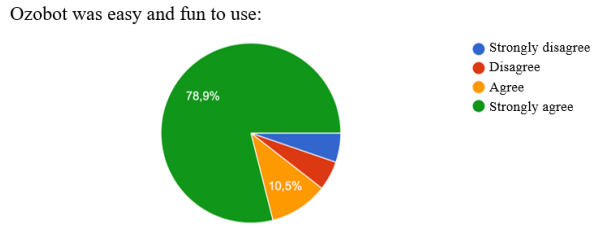


Graphic 4. Student's Ozobot management skills.

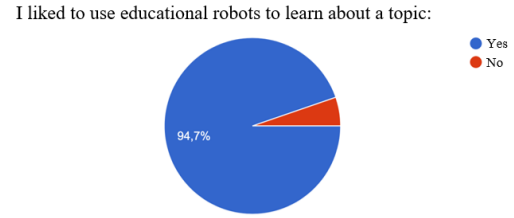
In addition to this test, students were asked to answer a couple of questions regarding the use of the Ozobot (see Graphics 5 to 7 below).



Graphic 5. Ozobot's effect on student storytelling structuring.



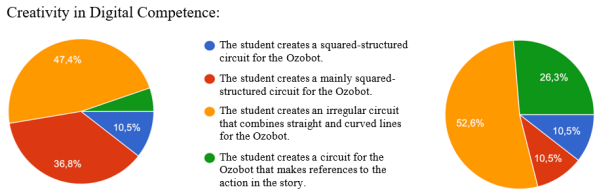
Graphic 6. Student reception to Ozobot use.



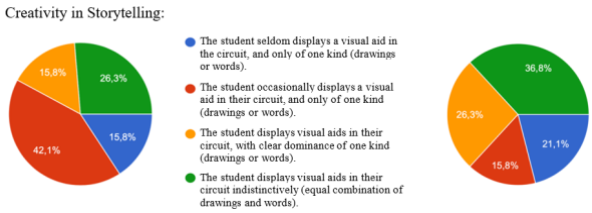
Graphic 7. Student's satisfaction with educational robotics

The results show the students' largely positive incorporation of the Ozobot as a learning and motivational tool, while also highlighting its easiness of use and its short adaptation period, which is an important characteristic when considering that many teachers do not incorporate educational robotics due to the "lack of preparation and knowledge and a series of misconceptions about the robot's uses" (as referenced in section 2.2. Robotics and EFL (Jurado et al., 2020; Ruiz Vicente, 2017; Alimisis, 2013). For all of these reasons, we consider Ozobot to be an easy and effective way to introduce RALL in the EFL classroom. Furthermore, these results show a promising route for further research regarding the potential of non-social robots for language learning.

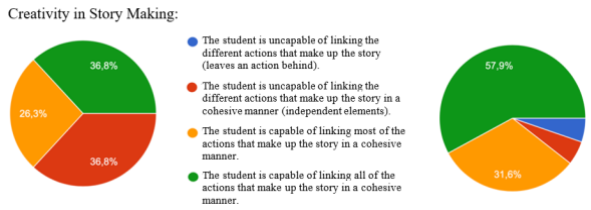
The last measured variable in the storytelling activities was creativity, as previous studies have shown its link to the use of educational robotics (Ruiz Vicente, 2017). In this regard, the investigation seems to support that previous conclusion, for all parameters measured have experienced a significant increase from the initial test (see Graphics 8 to 10 below).



Graphic 8. Student creativity in Ozobot circuit design.



Graphic 9. Creativity and use of visual aids in the storytelling circuit.



Graphic 1. Student's creative linking of the different elements of the story.

Furthermore, it is important to highlight that the use of Ozobot as a tool for storytelling allowed students to be creative, not only on the linguistic dimension or the content of the story but also on the use of robotics. Students increased their design of non-linear circuits with more correlation between story and shape (such as representing "running" through straight lines and "searching/walking" with curved and irregular paths) and incorporated more quantity and different kinds of visual support. However, several variables may have also contributed to this evolution, such as a more schematic and controlled approach to the creation of the circuit, the gained control and confidence over the managing of the Ozobot, and the extended time given for the completion of the activity (2 sessions).

Several examples of Ozobot circuits, created both before and after the didactic proposal, will be now presented to compare the progress previously described in this area (see Figure 1 below). The former will be placed on the left column, while the latter on the right; however, circuits on the same row do not necessarily correspond to the same student.

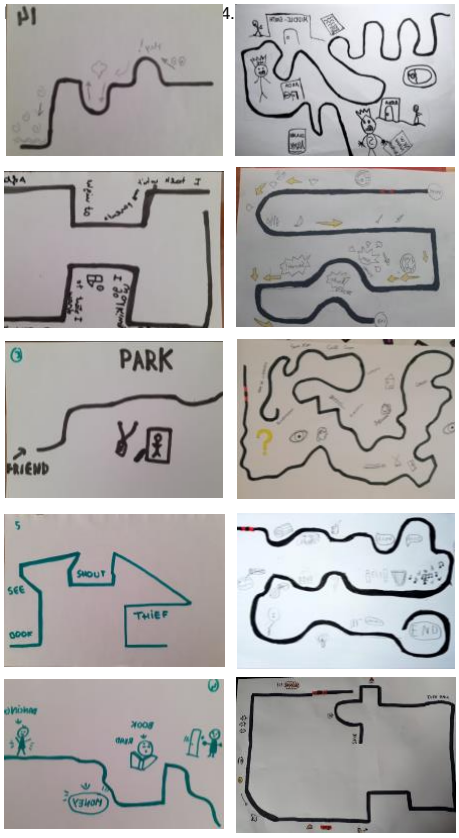


Figure 2. Student evolution of Ozobot circuit design

The clear evolution of circuit design and complexity has several explanations, such as increased experience with the Ozobot or exposure to circuit examples; nonetheless, whilst initially scarce and more conservative, creative use of the Ozobot in storytelling proves itself as versatile and with great potential, even at a basic level of use.

4.3 Direct observation: Research Journal

Despite the students being used to several methodologies and educational technologies, it was the first time they were introduced to IBL and robotics. On the first day, students were quite hesitant to participate in the inquiry process, unsure of what to say (especially in the Conceptualisation phase, when making hypotheses or research questions). On several occasions I had to reassure them that there were no wrong answers; however, this stage seemed to be open and abstract. The following statement made by a student reflects a line of thought followed by many: "I'm not sure what you want me to say. I invent it?". After the Investigation phase, nonetheless, when we returned to our hypotheses and research questions to see if they were answered and the hypothesis confirmed, many students started to understand why we had done that previously (they even started to explain it amongst themselves). In fact, during the following sessions, students participated the most in the Conceptualisation phase, seeing the hypothesis nearly as a creative reasoned guess. Another comment we would like to highlight regarding IBL is the following: "I get it when we do it together, but alone… I wouldn't be able to see that" (a student after asking me to repeat the reasoning behind a confirmation of hypothesis). This comment reflects the importance of guided scaffolding at the early stages of inquiry, as motivation can even decrease if students do not get enough support (Suárez et al., 2018; Kirschner et al., 2006). IBL has a high toll on students' cognitive and metacognitive skills, making it important for the teacher to pay attention to their reactions and ensure that everyone is following their explanations.

Concerning translanguaging and collaboration between language subjects, the unifying theme of the didactic proposal allowed students to easily switch from one language to another, saving explanation time and establishing connections between their L1 and L2. In fact, during the introduction of the connectors in English (Session 3), when asking them to classify a list of sequencing connectors without prior explanation, a student quickly pointed out: "Ah! It's like what we talked about in Spanish yesterday, right?". On several occasions, references to what was addressed in both subjects were made, as they seemed to help students understand better what was being explained; however, no formal means of assessment were used to measure its impact on language learning, so further research is needed to analyse its effects beyond improved time management and comprehension during explanations.

Regarding the use of technology: Classcraft, Ozobot, and HTML5, students adapted really quickly and positively to the different technological tools that were being used: Classcraft, Ozobot, and HTML5. The second Classcraft was introduced, and students were extremely excited about using it. Every session, they asked if we were going to create another quest and how many points they would get for doing it. We could also hear them in the corridors and during break time showing off their latest avatar update, which reflected in their motivation and task implication (even after the end of the intervention, students asked if the teacher was going to continue using Classcraft). However, this led some students to focus more on the quest reward than on the task itself. During several corrections, some students who had incorrect activities stated the following: "If we change it, will we get the same reward?". Gamified LMSs use behaviourist principles to increase motivation (Akpolat and Slani, 2014). It is important to have good and clear control of the reinforcement system before its application, as motivation may drop if tasks are too easy, or too difficult, or if learners do not fully understand the mechanics of reward. It is also important to know which behaviours we are reinforcing: copying or learning; hence, reflection and understanding must always come before the reward. In turn, the students' response to the Ozobot was that of amazement and curiosity. Many required a couple of minutes playing around with it – or even asking questions about how it worked – before they could concentrate on the task at hand. After their first contact with the Ozobot, its use started to be more immediate: students would take the Ozobot, switch it on, and place it on the circuit; still, their gaze would be fixed on it until it completed the route. If the robot stopped, their initial reaction was to poke it or ask why it happened (mostly due to very thin circuit lines). Once they had corrected the mistake, however, they insisted on starting from the beginning, as they wanted to see it complete the circuit without fault. During the intervention, many students asked for more activities and tasks with the robot: "When are we going to do more stories with the Ozobot?" (a student after the diagnostic storytelling activity), confirming the results obtained in previous studies regarding motivation and engagement (Johnson, 2003). Finally, HTLM5 produced the least reaction in the students, as they were used to similar activities on other platforms. For this reason, in addition to it being embedded in their Moodle classroom, its use was immediate and efficient. Nevertheless, some technical problems derived from its use, such as registering all the student's answers or correct displaying of the activities.

5 CONCLUSIONS

From the gathered information, and taking into account the context of the intervention, a didactic proposal was created, presenting a structured inquiry about the literary world of Tolkien, which acted as a unifying theme across the intervention. This topic, however, not only guided the evolution of the English sessions but also acted as a connection point with the subject Spanish (students' L1), as they were under the same field of knowledge and taught by the same teacher. Finally, a series of assessment tools were put into place to analyse learning outcomes and the evolution of motivation. In the former, language learning, students' digital competence, and creativity were measured: results showed an improvement in student's acquisition of verb tenses and sequencing connectors, a quick adaptation period and mastery of the Ozobot, and significant potential for its creative usage in storytelling activities; hence proving the potential of technology-enhanced IBL as a language acquisition methodology.

Concerning the second variable (evolution of motivation), an ARCS analysis showed increased motivation in all four variables – especially in Relevance, with a rise of 8.63% – despite the class being used to educational technology and innovative methodologies before the study. In addition, amongst the tools used during the intervention, the gamified LMS (Classcraft) seemed to have the highest impact on student engagement, closely followed by the Ozobot. It is important to highlight that, whilst producing a generalised interest and curiosity towards Tolkien and his work, the topic seemed too complicated for some students. Extensive research of learner interest and language level is, therefore, recommended if the desired outcome is an increase of motivation towards literature.

As highlighted throughout the dissertation, several limitations were detected in the completion of this study; however, many of them gave rise to new lines of research:

- The need for several educational robots and computers is a limitation in and of itself, as they require a high economic investment. Further research could follow the line of studies such as the one by Gómez Gutiérrez (2018) or Chang et al. (2016), who used collaborative inquiry in their didactic proposal.
- The short duration of the intervention did not allow to analyse the long-term evolution of motivation regarding the gamified LMS and robotics. For this reason, further research would be needed in this area to confirm or propose a solution to the decrease in interest due to the novelty factor of technology (highlighted by Ruiz Vicente (2017) and Kanda et al. (2004) in their studies).
- The extension of the dissertation did not allow to fully address the area of translanguaging, collaboration between language subjects, and its effects on language acquisition. Observed results highlight this field as a promising line of study; however, it is not sure whether the current changes in the organisation of subjects, which allowed collaborative work between the languages of English and Spanish, will remain in the long term, as it was created as a safety measure during the pandemic. For this reason, possibilities in the reproduction of the current study and/or further research in this field may be difficult in the Spanish educational system.
- Teachers who want to replicate the intervention will have to go through a training/adaptation period to incorporate the use of the Ozobot in the classrooms. Furthermore, they will also require a high initial time investment to create and organize the materials for the Structured inquiry, as it must account for several levels of competence.

In addition to the presented limitations and their corresponding further lines of research, there is a wide area of study analysing the effects in language learning and motivation of different forms of technology in an IBL environment. This not only extends to other educational robots but also other technological tools, such as using mobile phones or virtual reality. It is the combined results of studies in this field that will allow us to uncover the full potential of IBL in the EFL classroom.

Further research in a more traditional environment would be needed to analyse students' adaptation process and motivation changes to this tool. Likewise, we will consider using qualitative designs to complement our existing design to unravel the development of motivation and language proficiency.

REFERENCES

Akpolat, B. S., & Slany, W. (2014, April). Enhancing software engineering student team engagement in a high-intensity extreme programming course using gamification. In *2014 ieee 27th conference on software engineering education and training* (csee&t) (pp. 149-153). IEEE.

Alameddine, M. & Ahwal, H. (2016). Inquiry-Based Teaching in Literature Classrooms. *Procedia - Social and Behavioral Sciences. 232*. 332-337.

Alimisis, D. (2012). Robotics in education & education in robotics: Shifting focus from technology to pedagogy. In *Proceedings of the 3rd International Conference on Robotics in Education* (pp. 7-14).

Altin, H., & Pedaste, M. (2013). Learning approaches to applying robotics in science education. *Journal of Baltic Science Education, 12*(3), 365.

Asiri, A., Panday-Shukla, P., Rajeh, H. S., & Yu, Y. (2021). Broadening Perspectives on CALL Teacher Education: From Technocentrism to Integration. *TESL-EJ, 24*(4), n4.

Becker, S., Klein, P., Gößling, A., & Kuhn, J. (2020). Using mobile devices to enhance inquiry-based learning processes. *Learning and Instruction, 69.*

Benitti, F. B. V. (2012). Exploring the educational potential of robotics in schools: A systematic review. Computers & Education, 58(3), 978-988.

Bisquerra, R. (2009). *Metodología de la Investigación Educativa 2da*. ed. La Muralla.

Carlgren, T. (2013). Communication, critical thinking, problem-solving: A suggested course for all high school students in the 21st century. Interchange, 44(1-2), 63-81.

Chang, C., Chang, C. K., & Shih, J. L. (2016). Motivational strategies in a mobile inquiry-based language learning setting. System, 59, 100-115.

Daniela, L., & Lytras, M. D. (2019). Educational robotics for inclusive education. Technology, Knowledge and Learning, 24(2), 219-225.

Engwall, O. & Lopes, J. (2020). Interaction and collaboration in robot-assisted language learning for adults. Computer Assisted Language Learning. 1-37.

Gómez Gutiérrez, A. J. (2018). Collaborative inquiry in the EFL classroom: exploring a school-related topic with fifth graders. Colombian Applied Linguistics Journal, 20(2), 248-262.

Johnson, J. (2003). Children, robotics, and education. Artif Life Robotics 7, 16–21.

Jurado, E., Fonseca, D., Coderch, J., & Canaleta, X. (2020). Social STEAM Learning at an Early Age with Robotic Platforms: A Case Study in Four Schools in Spain. Sensors, 20(13). http://dx.doi.org/10.3390/s20133698

Kanda, T., Hirano, T., Eaton, D., & Ishiguro, H. (2004). Interactive robots as social partners and peer tutors for children: A field trial. Human-Computer Interaction, 19, 61–84.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. Educational Psychologist, 41(2), 75-86.

Luke, CL. (2006). Fostering learner autonomy in a technology-enhanced, inquiry-based foreign language classroom. Foreign Language Annals. 39, 71-86.

McCormick, N. J., Clark, L. M., & Raines, J. M. (2015). Engaging students in critical thinking and problem solving: A brief review of the literature. Journal of Studies in Education, 5(4), 100-113.

Ogle, D. (1986). K-W-L: A teaching model that develops active reading of expository text. The Reading Teacher, 39, 564-570.

Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. Educational research review, 14, 47-61. https://doi.org/10.1016/j.edurev.2015.02.003

Permana, G. A., Parno, P., Hidayat, A., & Ali, M. (2021). Improving creative thinking skill of fluid dynamic through IBL-STEM with formative assessment. In AIP Conference Proceedings (Vol. 2330, No. 1). AIP Publishing. https://doi.org/10.1063/5.0043128

Piaget J, Infelder B. (1975). The origin of the idea of chance in children. New York: Norton.

Pressley, H., Streit, W., & McCartt, S. (2022). Flattening the Learning Curve: Narrowing STEAM Achievement Gaps via a Research Curriculum. Technology and Engineering Teacher, 81(6), 8-13.

Rejeki, S. (2017). Inquiry-based language learning (IBLL): theoretical and practical views in English classroom. English Franca., 1(2), 135–148.

Ruiz Vicente, F.A. (2017). Diseño de proyectos STEAM a partir del currículum actual de Educación Primaria utilizando Aprendizaje Basado en Problemas, Aprendizaje Cooperativo, Flipped Classroom y Robótica Educativa. Alfara del Patriarca (Valencia): Universidad CEU Cardenal Herrera, Facultad de Humanidades y Ciencias de la Comunicación, Departamento de Ciencias de la Educación.

Ruiz del Solar and Avilés, (2004, as referenced in p. 37), where 84% of the 700 participants in an educational robotics program said they would consider enrolling in the STEM fields at university.

Staver, J. R., & Bay, M. (1987). Analysis of the project synthesis goal cluster orientation and inquiry emphasis of elementary science textbooks. Journal of Research in Science Teaching, 24(7), 629-643.

Suárez, A., Specht, M., Prinsen, F., Kalz, M., & Ternier, S. (2018). A review of the types of mobile activities in mobile inquiry-based learning. Computers & Education, 118, 38-55.

Vivas Fernández, L., & Sáez López, J. M. (2019). Integración de la robótica educativa en Educación Primaria. Revista Latinoamericana de Tecnología Educativa. RELATEC, 18(1), 107-128.

Willingham, D. T. (2008). Critical thinking: Why is it so hard to teach? Arts Education Policy Review, 109(

EXPLORANT L'UNIVERS LITERARI DE TOLKIEN A L'AULA D'EFL. APROXIMACIÓ A LA LITERATURA MITJANÇANT L'APRENENTATGE BASAT EN LA INDAGACIÓ MILLORAT PER LA ROBÒTICA

Aquest article examina com l'aprenentatge basat en la indagació millorat per la tecnologia (IBL) va afectar l'adquisició de la llengua dels estudiants i l'evolució de la motivació a l'assignatura d'anglès com a llengua estrangera (EFL). A més, aquest estudi presenta una proposta de col·laboració de les assignatures de castellà i anglès, utilitzant la traducció per establir connexions entre la L1 i la L2 dels alumnes i reduir les duplicacions curriculars. L'EFL es presenta com una oportunitat perquè els estudiants es comprometin amb un abast més ampli de recursos autèntics, utilitzant l'aprenentatge basat en la indagació (IBL) com a principal força impulsora de situacions de resolució de problemes. Així, la investigació va utilitzar el món literari de Tolkien com a principal tema i tema de recerca, i la robòtica (Ozobot), IBL i un sistema de gestió de l'aprenentatge gamificat (Classcraft) com a principals metodologies. Mitjançant una sèrie de proves de diagnòstic i de competència (que incloïen una activitat de narració amb robot i una prova de motivació ARCS), es van recollir dades quantitatives sobre les dues variables analitzades. Els resultats van indicar una millora en l'adquisició del llenguatge i la motivació en els quatre paràmetres. A més, Ozobot va demostrar tenir un període d'adaptació ràpida per a l'ús dels estudiants als nivells bàsics de funcionament, a més d'ajudar a la narració creativa. Els resultats contribuiran a tancar la bretxa de coneixement detectada en l'aprenentatge de l'EFL, ja que s'ha utilitzat principalment per a l'aprenentatge científic.

PARAULES CLAU: Aprenentatge basat en la indagació (IBL); Anglès com a llengua estrangera (EFL); robòtica; literatura; Classcraft

EXPLORANDO EL UNIVERSO LITERARIO DE TOLKIEN EN EL AULA DE INGLÉS COMO LENGUA EXTRANJERA. ABORDAR LA LITERATURA A TRAVÉS DEL APRENDIZAJE BASADO EN LA INVESTIGACIÓN MEJORADO POR LA ROBÓTICA

Este artículo examina cómo el aprendizaje basado en la indagación (IBL) complementado por la tecnología afectó a la adquisición del idioma y la evolución de la motivación del alumnado de la asignatura de inglés como lengua extranjera (ILE). Además, este estudio presenta una propuesta para la colaboración de las asignaturas de español e inglés, utilizando el translenguaje para establecer conexiones entre L1 y L2 del alumnado y reducir la duplicidad curricular. ILE se presenta como una oportunidad para que el alumnado se involucre más en la asignatura con un alcance más amplio de recursos originales, utilizando el aprendizaje basado en la indagación (IBL) como la principal fuerza impulsora de resolución de problemas. Así, la investigación utilizó el mundo literario de Tolkien como tema principal y tema de investigación, y la robótica (Ozobot), IBL y un sistema de gestión de aprendizaje gamificado (Classcraft) como metodologías principales. A través de una serie de pruebas de diagnóstico y competencia (que incluyeron una actividad de narración asistida por robot y una prueba de motivación ARCS), se recopilaron datos cuantitativos sobre las dos variables analizadas. Los resultados indicaron una mejor adquisición del lenguaje y motivación en los cuatro parámetros. Además, Ozobot demostró tener un período de adaptación rápido para el uso de los estudiantes en niveles básicos de funcionamiento, además de ayudar en la narración creativa. Los resultados contribuirán a cerrar la brecha de conocimiento detectada en el aprendizaje de ILE, ya que se ha utilizado principalmente para el aprendizaje científico.

PALABRAS CLAVE: Aprendizaje basado en la indagación(IBL); Inglés como lengua extranjera (EFL); Robótica; Literatura; Arte de clase