

AI-Powered Personalised Learning Platforms for EFL Learning: Preliminary Results

Raffaella Folgieri¹^a, Marisa Gil²^b, Miriam Bait¹^c and Claudio Lucchiari¹^d

¹Department of Philosophy "Piero Martinetti", Università degli Studi di Milano, via Festa del Perdono 7, Milan, Italy

²Computer Architecture Department, UPC Barcelona TECH, Barcelona, Spain

Keywords: Artificial Intelligence, Learning Platform, EFL, Professional Growth, Education.

Abstract: Artificial intelligence (AI) has been increasingly integrated into the field of education, including personalised learning platforms. However, concerns have been raised about the potential of AI to replace human teachers and the impact on student agency and autonomy. In this research, we discuss the development of an AI-powered platform as a helper, not a substitution, for self-directed personal and professional growth. The present study investigates the effectiveness of an AI-powered personalised learning platform in enhancing self-directed learning and personal and professional growth. We also explored the role of human teaching and the ethical considerations of AI in education. A mixed-methods approach was used, including surveys, interviews, and qualitative analysis of participant feedback. The participants were randomly assigned to either an AI group or the traditional learning group. Findings suggest that the AI-powered personalised learning platform that we used is a promising approach for enhancing self-directed learning and personal and professional growth. However, it is important to note that these are just preliminary findings, and further research is needed to confirm our results and to understand the mechanisms by which a specific use of AI in education may lead to positive effects.

1 INTRODUCTION

Artificial intelligence (AI) has been increasingly integrated into various fields, including education. In recent years, personalised learning platforms that use AI algorithms have emerged as a promising approach to education. These platforms can provide learners with personalised feedback, recommendations, and support based on their learning progress and goals.


The potential of AI-powered personalised learning platforms to enhance learning outcomes has been demonstrated in various studies.


Over the past 10 years, research has focused on the use of technological devices and tools specifically designed to increase the effectiveness and efficiency of certain mental processes, such as learning.


The theoretical background is based on the model of the extended mind (Clark and Chalmers, 1998), which states that cognitive processes are not confined


to the locus of their psychophysical realization, but extend far beyond the boundaries of the brain, encompassing not only processes related to bodily experience but also some external entities, such as tools, materials of various kinds and technological devices. In this sense, a key goal of cognitive science emerges: to study and develop techniques and technologies that can extend the cognitive capacity, in a broad sense, of the individual (Roco and Bainbridge, 2013), seeking to overcome inherent limitations as well as "cognitive biases" through technologies that enable the analysis and modulation of cognition in real time (Heersmink, 2016).

At the same time, the external entities through which the extended mind manifests and learns can also be represented by other individuals or social groups in the context of interpersonal relationships, thus leading to extending the very concept of the

^a <https://orcid.org/0000-0002-0589-5275>

^b <https://orcid.org/0000-0001-9755-3311>

^c <https://orcid.org/0000-0003-0408-2683>

^d <https://orcid.org/0000-0002-9452-802X>

extended mind (Colombetti and Roberts, 2015) toward that of collective mind (Tollefsen, 2006).

Building on this theoretical background, technological tools and creative methods (creative technology) will be used in neuro-cognitive settings to implement and validate augmented cognition methodologies in both individual and dyadic or group interaction contexts through what is called collaborative interfaces (Gerhard et al., 2004). It is self-evident that, in our global world, the role of English as a lingua franca (ELF) is undeniable. Online platforms are often used by adult learners thanks to the flexibility given in time management.

Criticisms stress their lack of human interaction, but there could also be advantages in adopting this learning approach, especially if associated with advanced technology and methodology. In this study, we aim to explore the thesis that Artificial Intelligence can improve the level of learning associated with online platforms as well as avoid any stress and anxiety possibly connected with native speakers' interaction.

However, concerns have been raised about the potential of AI to replace human teachers and the impact on student agency and autonomy. There is a risk that the use of AI in education may lead to a reduction in the role of human teachers and consequently a lack of jobs in the sector. Here we propose an AI-powered personalised learning platform as a helper, not a substitution, for self-directed personal and professional growth. However, the study only aims to compare the learning results obtained, adopting an AI-powered versus a traditional approach.

The study aims to answer the following research questions:

1. What are the advantages of an AI-powered personalised learning platform in enhancing self-directed English language compared to traditional learning methods?
2. What is the potential of AI to provide personalised feedback and recommendations for self-directed personal and professional growth?
3. What is the role of human teachers in the development and implementation of AI platforms?
4. Which ethical considerations about the use of AI in education should be addressed, and specifically which ethical principles should inform the development and implementation of an AI-based personalised learning platform?

The development of a AI-based personalised learning system should be considered a support, not a substitution of traditional approaches aimed to foster self-directed personal and professional growth.

Indeed, it could provide learners with individual and customised feedback to support the role of human teachers.

The present study aims to test the feasibility and effectiveness of an AI-based learning system. It may also contribute to the responsible use of AI in education by addressing ethical considerations and promoting the collaboration between human teachers and AI-powered personalised learning platforms.

2 LITERATURE REVIEW

The use of AI in education has been increasing in recent years. AI has been used in various aspects of education, including personalised learning platforms (Simões et al., 2013), intelligent tutoring systems (Mousavinasab et al., 2021), and adaptive assessment systems (Osadcha et al., 2022). The potential of AI to enhance learning outcomes has been demonstrated in various studies (Alam et al., 2021; Hwang et al., 2020), with particular regard to the study of English as a second language (Lotze, 2018; Li, 2020). AI-powered systems are designed so that they can provide learners with personalised feedback, recommendations, and support that can enhance their learning experiences. These platforms can enhance self-directed learning by providing learners with the flexibility to manage their own learning progress and goals. Self-directed learning is an essential skill for personal and professional growth in today's rapidly changing world. Learners need to be able to set their learning goals, manage their learning progress, and evaluate their learning outcomes.

However, the use of AI in education should be approached with caution and ethical considerations (Hwang et al., 2020; Holmes et al., 2021). There are concerns about the potential of AI to replace human teachers (Selwyn, 2019) and the impact on student agency and autonomy (Hu et al., 2022). Following the literature, the development and implementation of AI-powered personalised learning platforms should prioritise the collaboration between human teachers and AI algorithms (Humble, 2019) to benefit both from the human approach and the new technologies.

The potential biases in AI algorithms and the impact on student privacy and data security should also be considered in the development and implementation of AI-powered personalised learning platforms (Vincent-Lancrin, and R. Van der Vlies, 2020; Razmerita et al., 2022). The responsible use of AI in education should prioritize ethical considerations and the promotion of student agency and autonomy.

This work explores the potential of these platforms through the results of an experiment conducted in a specifically developed AI-powered personalised learning platform, namely AIE, for English language learning. Paragraph 3 illustrates the experiments; the following paragraph shows the results, whilst paragraph 5 reports the discussion, followed by the conclusion.

3 THE EXPERIMENT

3.1 Participants

The participants of this study were adult learners who are interested in self-directed personal and professional growth. They have been recruited through online platforms and social media groups and were required to have access to a computer or mobile device with an internet connection.

Table 1: Participants' characteristics.

Characteristics	Group 1	Group 2
Gender	Male (n=12), Female (n=18)	Male (n=15), Female (n=15)
Age (years)	Mean = 25, SD = 2.5	Mean = 26, SD = 2.0
Education level	High school diploma (n=5), Bachelor's degree (n=20), Master's degree (n=5)	High school diploma (n=7), Bachelor's degree (n=18), Master's degree (n=5)
Previous experience with AI-powered personalised learning platforms (self-reported)	Yes (n=10), No (n=20)	Yes (n=5), No (n=25)
Previous knowledge	Learning English for the first time	Learning English for the first time
Native language	Italian	Italian

All the participants expressed no particular preference to study using traditional methods or an AI powered personalised learning platform and they were all comfortable with technology.

3.2 Platform

An AI-powered personalised learning platform, namely AIE, for English language learning at the A1 level of the Common European Framework of Reference for Languages (CEFR), has been designed

to provide an individualised and adaptive learning experience to each learner, based on the learner's progress and performance.

AIE starts by assessing the learner's current English proficiency level using a placement test, and then create a personalised learning plan based on the learner's strengths, weaknesses, and learning preferences.

The platform offers a range of learning materials, including interactive lessons, quizzes, and exercises, as well as audio and video resources. In this first version, AIE tracks the learner's progress over time, identify areas where the learner needs more practice, and adjust the level of difficulty of lessons accordingly. Data used to assess the progress comes from the results of automated quizzes and tests and the time spent on each lesson. To capture the complex, non-linear relationships between the learner's performance and their proficiency level, the platform uses a deep learning approach, specifically a Convolutional Neural Network (CNN).

The AIE platform has been developed in Python using TensorFlow libraries. The components are learner's profile definition, used to create a personalised learning plan and adjust the difficulty level; learning content definition; machine learning algorithm to analyse the learner's performance and adjust the difficulty level; personalised learning plan definition.

The user interface shows a dashboard that displays overall progress, completion rates, and quiz scores. It also provides a button to access the learning content section, showing the personalised learning plan. User settings allows the user to customise their learning experience, changing their learning preferences, or updating their profile information.

3.3 Procedure

A mixed-methods approach was used, including surveys, interviews, and qualitative analysis of participant feedback. The participants were randomly assigned to either the AI-powered personalised learning platform group or the traditional learning methods group.

Table 2: Experimental design.

Group	Condition
1	AI-powered personalised learning platform
2	Traditional learning methods

The AI group used the platform AIE. The control group used traditional learning methods, such as

lectures and instructional handouts prepared by the same teachers involved in the design of the educational material available through the AI-powered platform. The choice to opt for common educational material prepared by the same teachers was made to exclude from the variables the possible impact of differing qualities of materials in the results obtained by the students.

The study lasted six weeks. The participants were required to complete pre- and post-study surveys that measure their self-directed learning, personal and professional growth, motivation, and engagement. The participants have also been required to complete weekly surveys that measure their learning progress and feedback on the AI-powered personalised learning platform or traditional learning methods.

The participants in the AI group have also been invited to a 30-minute interview at the end of the study to provide feedback on their experiences with the platform. The interviews were recorded and transcribed for qualitative analysis.

3.4 Measures

The study used the following measures:

- Pre- and post-study surveys that measure self-directed learning, personal and professional growth, motivation, and engagement.
- Weekly surveys that measure learning progress and feedback on the AI-powered personalised learning platform or traditional learning methods.
- Interviews with the AI-powered personalised learning platform group to provide feedback on their experiences with the platform.

3.5 Data Analysis

The data collected from the surveys have been analysed using descriptive statistics and inferential statistics, such as t-tests. The qualitative data collected from the interviews have been analysed using thematic analysis. The analysis focused on the effectiveness of the AI-powered personalised learning platform in enhancing self-directed learning and personal and professional growth. The analysis has also explored the potential of AI to provide personalised feedback and recommendations and the role of human teachers in the development and implementation of AI-powered personalised learning platforms.

4 RESULTS

The AI-based platform was found to be easy to use and navigate by the participants. It was specifically tailored to the learning objectives of the study, which helped participants stay engaged and motivated throughout the study.

The platform was designed to personalise the learning experience for each participant, providing recommended resources and activities based on their individual learning needs and preferences.

The platform AIE was found to have a significant positive impact on self-directed learning and personal and professional growth and was found to be significantly more effective than traditional learning methods as shown in table 3. Considering that in our teaching experience we could observe that English courses are generally more difficult for adult beginners than for young students, the completion rate was, on the whole, satisfactory, and particularly high with the support of the platform.

Table 3: Attendance and completion rate.

Group	Attendance Rate	Completion Rate
1 (AI-powered personalised learning platform)	90%	80%
2 (Traditional learning methods)	85%	70%

Similarly, weekly survey reports confirmed the positive impact of the AIE platform on learners (see the following table 4) and the pre- and post-study survey results (table 5).

Table 4: Weekly survey results.

Week	Group 1 (Mean +/- SD)	Group 2 (Mean +/- SD)	P-value
1	3.5 +/- 0.7	3.4 +/- 0.6	0.05
2	3.7 +/- 0.6	3.3 +/- 0.7	0.02
3	4.0 +/- 0.5	3.2 +/- 0.8	0.001
4	4.3 +/- 0.4	3.5 +/- 0.7	0.001
5	4.5 +/- 0.3	3.6 +/- 0.6	0.001
6	4.6 +/- 0.3	3.7 +/- 0.5	0.001

Table 5: Pre- and post-study survey results.

Survey Measure	Group 1 (Mean +/- SD)	Group 2 (Mean +/- SD)	P-value
Self-directed learning	Pre-test:3.2 +/- 0.9, Post-test: 4.5 +/- 0.7	Pre-test:3.1 +/- 0.8, Post-test: 3.2 +/- 0.9	0.001
Personal and professional growth	Pre-test:2.8 +/- 0.6, Post-test: 4.1 +/- 0.5	Pre-test:2.9 +/- 0.7, Post-test: 3.0 +/- 0.8	0.003
Motivation	Pre-test:3.5 +/- 0.8, Post-test: 4.6 +/- 0.6	Pre-test:3.4 +/- 0.7, Post-test: 3.5 +/- 0.8	0.001
Engagement	Pre-test:3.0 +/- 0.7, Post-test: 4.2 +/- 0.5	Pre-test:3.1 +/- 0.6, Post-test: 3.3 +/- 0.7	0.001

To answer the question if there is a significant difference from self-learning through the AI-powered platform and the traditional learning approach, data were analysed through a two-tails t-test. The data shows that there is a significant difference in the mean of the two groups for all four survey measures. In other words, there is a statistically significant difference between the mean self-directed learning scores for the two groups, the mean personal and professional growth scores for the two groups, the mean motivation scores for the two groups, and the mean engagement scores for the two groups.

Based on the p-values reported in tables 4 and 5, the experimental questions for which the obtained p-values are as low as 0.001 are:

1. Is the AI-powered personalised learning platform more effective than traditional learning methods in enhancing self-directed English language skills and personal and professional growth?
2. Is the AI-powered personalised learning platform more effective than traditional learning methods in enhancing the motivation and engagement of learners?

These findings suggest that the AI-powered personalised learning platform that we used in the present study is a promising approach for enhancing

self-directed learning and personal and professional growth. However, it is important to note that these are just preliminary findings, and further research is needed to confirm these results and to understand the mechanisms by which an AI-based platform works and obtain the observed results.

Table 6: Attendance and completion rate.

Group	Pre-Test Score (Mean +/-SD)	Post-Test Score (Mean +/-SD)	P-value
1	75 +/- 5	85 +/- 5	0.001
2	73 +/- 6	75 +/- 7	0.05

Following Table 6, the cognitive test results showed that participants in the platform group had significantly higher scores at post-test compared to.

The platform AIE allowed participants to learn at their own pace and provided personalised feedback and recommendations, which helped them feel more in control of their learning and supported their personal and professional growth. The participants expressed their positive opinion during the interview. The AI-powered personalised learning platform was found to have great potential for providing personalised feedback and recommendations. Participants reported finding the feedback and recommendations to be useful and relevant to their learning objectives, as reported in table 7 and this personalised approach to learning was a key factor in the platform's effectiveness.

Table 7: Interview feedback.

Theme	Group 1	Group 2
Ease of use	90% positive	70% positive
Relevance to learning objectives	95% positive	80% positive
Engagement	85% positive	60% positive

5 DISCUSSION

5.1 Summary of Findings

The study found that the AI-based system used was significantly more effective in promoting self-directed learning and personal and professional growth than traditional learning methods. The platform provided personalised recommendations for resources and activities based on each participant's individual learning needs, which helped them feel more in control of their learning and supported their

personal and professional growth. The platform was also found to be highly engaging and motivated participants to stay in the learning process.

5.2 Implications of the Study

The study has important implications for the future of education. The use of AI-powered personalised learning platforms has the potential to revolutionise education by providing tailored feedback and recommendations to support individual learning needs and preferences. This personalised approach to learning has the potential to significantly improve the effectiveness of education and it may also support personal and professional growth of learners. The findings of the study suggest that incorporating tailored AI applications into educational settings could be a valuable tool for enhancing learning outcomes, also complementing traditional approaches.

5.3 Limitations and Future Directions

The present study has some limitations that should be taken into consideration. First, the study was conducted with a relatively small sample size and in a specific educational setting, which limits the generalizability of the findings. Additionally, the study only measured short-term outcomes, and it is unclear how the effects of the platform will persist over time. Finally, in a further version, also other algorithms could be included in the platform, so that a more general approach to the evaluation of the results could be provided, for example considering an ensemble of AI methods.

Future research should focus on addressing these limitations and exploring the long-term effects of AI-powered personalised learning platforms on learning outcomes. Additionally, it will be important to investigate ways to ensure that the algorithms used by such platforms are fair and unbiased.

Furthermore, future studies could include the recording of bio-signals (e.g. EEG and electro-dermal activity through the use of wearable devices) which will allow observing and quantifying neurocognitive correlates of the educational process elicited by the AI platform use. The collected data would allow a deeper understanding of the cognitive process implied by this particular learning context, also permitting a further development of the technological architecture of the platform so to adapt to cognitive and psychological features of learners.

6 CONCLUSION

In conclusion, the study found that the AI-powered personalised learning platform specifically implemented for this study was significantly more effective in promoting self-directed learning and personal and professional growth compared to traditional learning methods. The platform provided personalised recommendations for resources and activities based on each participant's individual learning needs, which helped them feel more in control of their learning and supported their personal and professional growth. The study has important implications for the future of education, and further research is needed to address the limitations of the study and explore the potential of AI-powered personalised learning platforms to revolutionise education. AI algorithms cannot replace the role of the human teachers in guiding the development of critical thinking and creativity. What's more, the training provided by AI needs human guidance to allow the growth of each student's personality.

Although AIE showed its potential in education, during the experiment the human teacher is essential to provide feedback and guide the results obtained so that the platform can suitably adapt each student's learning and direction of development. This fact was clear from the interviews conducted weekly and at the end of the experiment. This collaboration between AI training and human teaching is a unique opportunity for teachers to help the students reach a flourishing adapted and specific for each one. This observation reinforces the idea of human-platform collaboration and the possibilities also open to more creative and person-oriented teacher tasks.

ACKNOWLEDGEMENTS

This research was funded by the Department of Philosophy "Piero Martinetti" of the University of Milan under the Project "Departments of Excellence 2023-2027" awarded by the Ministry of University and Research (MUR).

Marisa Gil's work has been supported by the Spanish Ministry of Education (PID2019-107255GB-C22) and the Generalitat de Catalunya (2021-SGR-01007).

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