

## **ESP for the Digital Age: Mixed-Methods Study on AI-Supported Gamified Soft Skills Training**

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### **Abstract**

This mixed-methods research explores how AI-supported, gamified soft skills training influences psychological well-being, learner motivation, and autonomy in tertiary English for Specific Purposes (ESP) instruction based on the 21<sup>st</sup> century need. The 13-week intervention, implemented with 60 undergraduate Economics students at the University of Žilina, Slovakia, was theoretically grounded in Seligman's PERMA model and conceptually aligned with the OECD Learning Compass 2030 pillars and the soft skills STEPS approach conceptual framework. This approach develops socio-emotional and metacognitive capacities through student-centred learning, teacher support, energy management, problem-solving, and stress management. Although most ESP studies have traditionally focused on linguistic and subject-specific competence, the purposeful integration of AI-driven tools for soft skills development remains underexplored. Quantitative data were collected using a 25-item Likert-scale questionnaire (pre/post design) and analysed using SPSS (M, SD, Cohen's d), while qualitative reflections from learner journals were thematically analysed using NVivo. Together, these data sources provided a multifaceted understanding of the affective and metacognitive impact of AI-based learning tools. The results revealed statistically significant improvements in all three domains: psychological well-being ( $d = 0.89$ ), motivation ( $d = 0.46$ ), and autonomy ( $d = 0.27$ ). The findings confirm not only the pedagogical efficacy of AI-enhanced gamified learning but also its capacity to foster emotional stability, deeper engagement, and greater learner agency. This study contributes to ESP pedagogy by embedding emotional, cognitive, and metacognitive dimensions into instruction – a practical model for future-ready, holistic language education that supports the needs of digital-native learners moving beyond linguistic competence.

*Keywords:* ESP, PERMA model, OECD Learning Compass 2030, metacognition, AI-supported gamified tools

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## Introduction

The 21st century marks a transformative era of AI-assisted learning, reshaping English for Specific Purposes (ESP) through the integration of advanced digital platforms (e.g., ChatGPT, Perplexity AI, Gemini, Claude) and AI tools leading to soft skills development that support personalised instruction, rising motivation and well-being in student-centred language acquisition and collaborative learning.

## Integrative Conceptual Framework

The conceptual framework is guided by the STEPS five-element approach based on positive student-centred psychology, Seligman's PERMA model, adopting future-oriented educational paradigms of the OECD Learning Compass 2030. The goal is to enhance:

1. PERMA model defines well-being as the dynamic interaction of five dimensions: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment (Seligman, 2011).
2. OECD Learning Compass 2030 emphasises emotional regulation, adaptability, metacognitive awareness, collaboration, multi-culti interaction and adaptive well-being as core competencies for lifelong learning and holistic development (OECD, 2020) toward healthier digital engagement and enhanced academic, emotional, and social outcomes. To reinforce the conceptual framework, three AI-supported digital tools were selected for a home assignment: Coach.me for habit tracking and goal setting, Daylio for emotional self-reflection, and SuperBetter for gamified resilience-building as supportive soft skills.
3. STEPS five-element approach is based on learners need, teachers' support dealing with energy, problem solving and stress management.

Figure 1 shows the integrative framework that links the PERMA well-being pillars to the OECD Future-Ready Skills through the ESP Soft Skills student-centred STEPS approach.

**Figure 1**

*PERMA Model, OECD Skills and Soft-Skills STEPS Approach Framework*



*Note.* FLCAS (Foreign Language Classroom Anxiety Scale), FOMO (Fear of Missing Out)

These three pillars integrate cognitive, emotional, and behavioural components into ESP. Positive psychology and affective pedagogy shows that emotionally engaging language instruction enhances enjoyment, memory, and long-term effectiveness (Dewaele & Hu, 2023; MacIntyre & Al-Hoorie, 2024). Embedding soft skills into pedagogical frameworks empowers learners to operate more effectively in real-world academic and professional contexts, extending learning outcomes beyond linguistic performance.

### **Literature Review**

ESP in the twenty-first century systematically integrates interpersonal, behavioural, and emotional soft skills such as adaptability, self-regulation, and collaboration, competencies essential for sustainable professional success in global business world (McCabe et al., 2025; Mercer, 2021; Oxford, 2016). Emotionally engaging learning environments foster enjoyment and sustain motivation, while learner well-being is a condition for successful language acquisition (Dewaele & Hu, 2023; MacIntyre et al., 2024; Mercer, 2021). Within ESP contexts, emotional safety reduces anxiety and promotes engagement and motivation (Deci & Ryan, 2000; Dewaele & Hu, 2023; Seligman, 2011). The maintenance of positive conditions depends on metacognitive competence to plan, monitor, and evaluate their learning, developing autonomy, particularly in task-based, professional communication settings (Veenman, 2017).

At the same time, learner well-being drives motivation and long-term engagement, as reflected in Seligman's PERMA model (2011) and the OECD Learning Compass 2030 framework. Soft skills enhance both language learning and teaching by fostering communication, cooperation, adaptability, and emotional engagement (Elleuch, 2024), which were used in the ESP training.

The theoretical foundation of positive psychology, represented by Seligman's PERMA model, conceptualises well-being through five interconnected dimensions: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment. These dimensions parallel the OECD Learning Compass 2030, which promotes future-ready competencies such as adaptability, collaboration, ethical reflection, and metacognitive awareness.

Metacognition plays a central role in learner-centred ESP instruction. Learners' awareness and regulation of their cognitive processes support autonomy through planning, monitoring, and evaluation, which is critical in task-based and professionally oriented ESP environments (Veenman, 2017).

Reflective AI-supportive gamified tools focused on journaling, habit tracking, and resilience-oriented tasks that foster emotional regulation, motivation, and sustainable behavioural change can strengthen metacognitive and affective dimensions.

Three AI-supported gamified tools were implemented:

- SuperBetter (resilience and motivation),
- Coach.me (habit tracking and goal setting),
- Daylio (emotional reflection)

These applications provided structured feedback, reflective prompts, and motivational mechanisms that promoted emotional stability, engagement, and self-regulated learning.

In the ESP course, soft skills were developed through reflective AI-supportive tools focused on journaling, habit tracking, and resilience-oriented tasks that fostered emotional regulation, motivation, and sustainable behavioural change. Daylio mobile application supported emotional awareness through mood tracking, Coach.me facilitated consistent habit formation and goal progress, and SuperBetter gamified motivation and stress management through challenges and feedback. Together, these selected tools cultivated a learner-centred environment that nurtured emotional stability, collaboration, and learner autonomy while reinforcing intercultural communication and self-efficacy through scaffolded, feedback-based learning.

## Methodology

### Intervention Design

The AI-Supported Gamified Soft Skills Training integrated a series of student-centred activities aligned with Seligman's PERMA model and the OECD Learning Compass 2030 competencies. Activities were designed to strengthen emotional intelligence, metacognitive awareness, and collaborative engagement. The key interventions included:

- Icebreakers, reflection tasks, and team-based activities to foster emotional readiness, gratitude, and cooperative learning.
- Role plays, peer feedback sessions, and project-based tasks to enhance engagement, social interaction, and task motivation.
- Self-assessment and progress tracking to build learner confidence and autonomy.

Table 1 summarises the three gamified AI-supported tools integrated into the training to enhance well-being (stress management), autonomy (self-regulation), and motivation (task engagement).

**Table 1**

*Selected AI-Supported Gamified Tools for ESP Soft Skills Training*

| Tool/link                      | Key Characteristics                                                  | Educational Use in ESP                                                      |
|--------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------|
| SuperBetter<br>superbetter.com | Gamified well-being platform using quests, challenges, and power-ups | Builds resilience, supports stress management, fosters sustained motivation |
| Coach.me<br>coach.me           | Habit-tracking and goal-setting with progress monitoring             | Reinforces learning consistency and supports individualised ESP learning    |
| Daylio<br>daylio.net           | Visual self-reflection and mood tracking tool                        | Encourages emotional awareness, reflective learning, and self-motivation    |

Source: Authors

AI-gamified elements are effective when tasks are perceived as tailored, personalised, and adaptive (Klock et al., 2020), closely linked to the fulfilment of learners' psychological needs, particularly autonomy. Using them collectively helps create a holistic training framework for emotional stability, metacognitive engagement, and self-regulated learning.

## ***Study Goals Objectives, and Hypothesis***

This research examined three key learner development domains: well-being, motivation, and autonomy within an AI-enhanced ESP framework grounded in the PERMA, OECD and STEP models implemented in the research conceptual frameworks.

Table 2 summarises the research goals, objectives, and hypotheses that guided the study's design and analysis.

**Table 2**  
*Research Goals, Objectives, and Hypotheses*

| Goal                                                                             | Objective                                                                    | Hypothesis                                                                                                      |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Examine the impact of soft skills training on ESP learning outcomes.             | Evaluate how soft skills training improves students' well-being in ESP.      | H1: Soft skills training significantly enhances learners' psychological well-being via emotional safety in ESP. |
| Increase ESP learners' motivation and engagement through soft skills activities. | Assess the effect of motivationally aligned tasks on learners' engagement.   | H2: Task-based soft skills training significantly improves learners' motivation and task engagement.            |
| Foster learner autonomy via self-regulatory strategies.                          | Determine whether the soft skills training domains promote learner autonomy. | H3: Metacognitive and self-regulatory strategies significantly enhance learner autonomy in ESP learners.        |

Source: Authors

## ***Research Design***

A mixed-methods design investigated the effects of an intervention on psychological well-being, motivation, and autonomy, focusing on the main domain of an ESP course during the Winter Term 2025/26 at the University of Žilina, Slovakia. The program was involved in 13 weeks of semestral English instruction and was embedded as a part of weekly 100-minute ESP curriculum sessions together with hard skills training (professional PowerPoint presentations, implementing a topic-based glossary, grammar acquisition, quizzes, and criterion-based feedback, tests) and soft skills training as a part of each lesson.

## ***Participants***

Sixty Economics undergraduates at CEFR level B2 participated voluntarily. All consented according to university ethical standards (CEFR, Council of Europe, 2001). Participation in the study was voluntary and obtained with informed consent and ethical considerations.

## ***Data Collection***

Quantitative data were collected using a 25-item pre-and post-intervention Likert-scale student-centred questionnaire ( $\alpha = .87$ ), adapted from validated frameworks: PERMA-Profiler (Butler & Kern, 2016), MSLQ (Pintrich et al., 1991), and Self-Determination Theory (Deci & Ryan, 2000), targeted PERMA, OECD, and STEPS dimensions and metacognitive variables of AI tools.

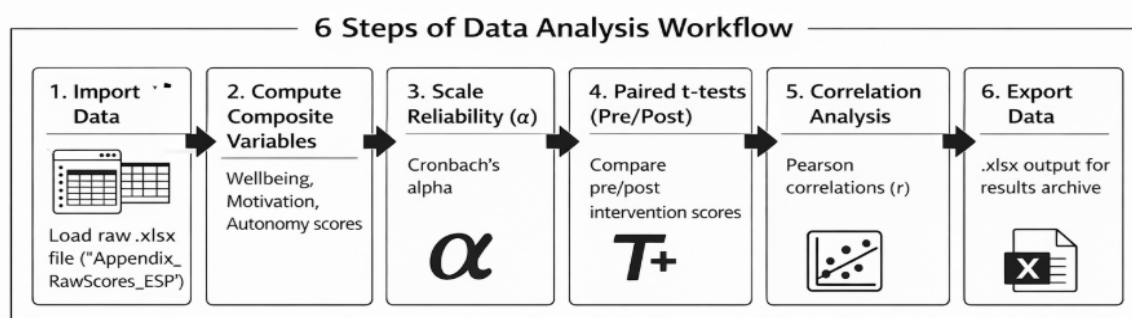
Qualitative data from learner journals and responses to two semi-open and five open-ended questions were analysed through thematic coding in NVivo to capture affective themes. Qualitative data were obtained from reflective learning journals and from responses to 2 half-open-ended and 5 open-ended items in the collected pre-post questionnaire. These were analysed thematically using qualitative coding procedures in NVivo.

### Data Analysis

Quantitative data were analysed using SPSS in a six-step workflow (Fig. 3). Paired-samples t-tests were conducted to compare pre- and post-intervention scores across the three domains. Effect sizes were reported using Cohen's  $d$ . The results indicated statistically significant improvements across all three measured dimensions.

**Figure 2**

*Six Steps of Quantitative Data Analysis*

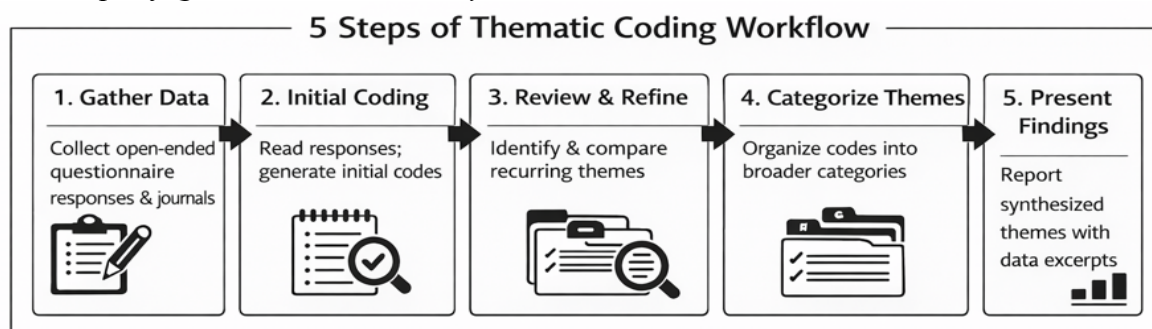


Source: Authors

Qualitative data were analysed thematically using qualitative coding procedures (Fig. 3).

**Figure 3**

*Five Steps of Quantitative Data Analysis*



Source: Authors

## Results

### Quantitative Findings

The intervention led to improvements across all three measured domains, as shown in Table 3. The most notable improvement was observed in psychological well-being, yielding a **large** effect size ( $d = 0.89$ ). Although the mean gain was moderate (+0.41), the low variability in participant responses contributed to a consistent and statistically significant outcome ( $t(59) =$

3.40,  $p < .001$ ). This indicates that the intervention had a substantial and homogeneous impact on learners' emotional safety, resilience, and perceived satisfaction.

Motivation showed a moderate effect ( $d = 0.46$ ), reflecting measurable gains in learners' task engagement and perceived relevance of learning activities. Despite a relatively smaller mean gain (+0.25), the statistical significance ( $p = .015$ ) and consistency of response patterns support the intervention's ability to positively influence motivational states in an ESP context. Autonomy, while yielding the smallest effect ( $d = 0.27$ ), still showed a statistically significant improvement ( $p = .001$ ). This indicates that gains in learners' self-regulatory behaviours and decision-making capacity were present but more gradual, suggesting that autonomy may require longer-term development beyond the scope of the instructional program. These findings align with Cohen's (1988) conventional thresholds:  $d \approx 0.2$  is considered small,  $d \approx 0.5$  is medium, and  $d \geq 0.8$  is large. Overall, the intervention was most effective in enhancing learners' emotional well-being, with moderate success in boosting motivation and initial, though meaningful, effects on learner autonomy.

**Table 3**

*Quantitative Analyses of Pre- and Post-questionnaire Results*

| Domain-based Hypothesis | Pre-test Mean (SD) | Post-test Mean (SD) | Mean Gain | t-value | p-value (2-tailed) | Effect Size (Cohen's d) |
|-------------------------|--------------------|---------------------|-----------|---------|--------------------|-------------------------|
| Well-being (H1)         | 3.44 (0.45)        | 3.85 (0.44)         | +0.41     | 3.40    | < .001             | 0.89 (large)            |
| Motivation (H2)         | 3.45 (0.45)        | 3.70 (0.41)         | +0.25     | 2.50    | .015               | 0.46 (medium)           |
| Autonomy (H3)           | 3.43 (0.48)        | 3.59 (0.47)         | +0.16     | 3.38    | .001               | 0.27 (small)            |

Source: Authors

Note. Paired-samples t-test (df = 59)

### ***Qualitative Findings***

Qualitative data were analysed thematically using NVivo software, employing in vivo coding to capture participants' authentic expressions and recurring patterns. The analysis revealed strong associations between learner experiences and the use of specific AI-supported tools. Reflective tracking tools enhanced emotional awareness and regulation; habit-tracking applications facilitated goal setting and behavioural consistency; and gamified, collaborative tools fostered motivation, resilience, and social interaction. These findings underscore the complementary role of AI-supported tools in addressing the emotional, motivational, behavioural, and social dimensions of ESP learning. Quotes reflected mostly these patterns:

**1. Emotional Regulation and Awareness.** Students frequently described increased emotional self-awareness and control when using reflection-based tools. As one participant wrote, "*Using Daylio helped me notice patterns in my moods and how they affected my study habits.*" Others highlighted emotional resilience: "*SuperBetter made me more aware of how small positive actions can reduce my stress before lessons.*" These reflections indicate that digital tracking supported both affective regulation and self-understanding.

**2. Motivational Engagement.** Motivation was strengthened by feedback loops and gamification. Learners reported that "*gamified tasks in SuperBetter kept me motivated even on busy days,*" while others noted that "*recording progress in Daylio gave me a sense of*

*consistency; it reminded me why I started this course.*” These statements reflect sustained engagement and intrinsic motivation fostered through regular feedback and self-monitoring.

**3. Learner Autonomy and Self-Regulation.** Participants emphasised how AI tools promoted self-directed learning habits. As one student noted, *“With Coach.me, I could monitor my study routines and adjust them independently.”* Another expressed, *“I realised how much control I have over my learning once I started tracking my progress.”* Such reflections reveal growing metacognitive awareness and learner autonomy in ESP.

**4. Sense of Achievement and Progress.** Across journals, learners expressed satisfaction with visible progress: *“Each completed task in SuperBetter felt like a reward — I could see my growth week by week.”* Similarly, *“Coach.me made my improvement visible; that visibility gave me confidence.”* This sense of accomplishment reinforced persistence and self-efficacy in their learning process.

**5. Social Interaction and Prosocial Behaviour.** Finally, collaboration and peer support emerged as central themes. Students appreciated the social aspects of AI tools: *“Collaborating in SuperBetter challenges strengthened our class community,”* and *“I learned that motivation grows when you support others — teamwork made learning less stressful.”* Such experiences suggest that shared digital environments foster a sense of belonging and collective resilience.

Table 4 shows that integrating AI-supported tools such as Daylio, SuperBetter, and Coach.me aligns with key qualitative categories, demonstrating their complementary roles in research.

**Table 4**

*Qualitative Coding Categories and AI-Supported Tool Contributions to ESP Learning*

| Qualitative Coding Category                | AI Tool(s)            | Tool-Specific Contribution to ESP Learning                                                                        |
|--------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------|
| Emotional Regulation and Awareness         | Daylio, SuperBetter   | Daylio supports mood tracking and reflection; SuperBetter builds emotional resilience through gamified tasks.     |
| Motivational Engagement                    | SuperBetter, Daylio   | SuperBetter gamifies motivational goals; Daylio maintains daily emotional and motivational awareness.             |
| Learner Autonomy and Self-Regulation       | Coach.me, Daylio      | Coach.me facilitates habit tracking; Daylio promotes self-reflection and consistent self-monitoring.              |
| Sense of Achievement and Progress          | Coach.me, SuperBetter | Coach.me offers progress tracking, while SuperBetter provides feedback through “power-ups” and achievement tasks. |
| Social Interaction and Prosocial Behaviour | SuperBetter, Coach.me | SuperBetter encourages team quests and resilience, while Coach.me offers community support and peer feedback.     |

Source: Authors

Overall, the qualitative findings suggest that integrating AI-supported tools significantly complements ESP learning by strengthening learners’ emotional regulation, increasing intrinsic motivation, supporting autonomous learning, and encouraging meaningful social interaction.

## Integration and Interpretation

Both quantitative and qualitative results confirmed all hypotheses (H1–H3) concerning learners' psychological well-being (H1), motivation (H2), and autonomy as a form of metacognitive self-regulation (H3). Gamified AI/supported platforms promoted sustained motivation via rewarding, feedback-rich activities; well-being improved through emotional stability and peer support; autonomy developed progressively through reflective self-regulation. These findings align with prior studies of researchers in this field (Bai & Li, 2024; Gkonou & Mercer, 2022; Vansteenkiste et al., 2020) and indicate that technology-enhanced feedback fosters emotional resilience and motivation in EFL and ESP contexts.

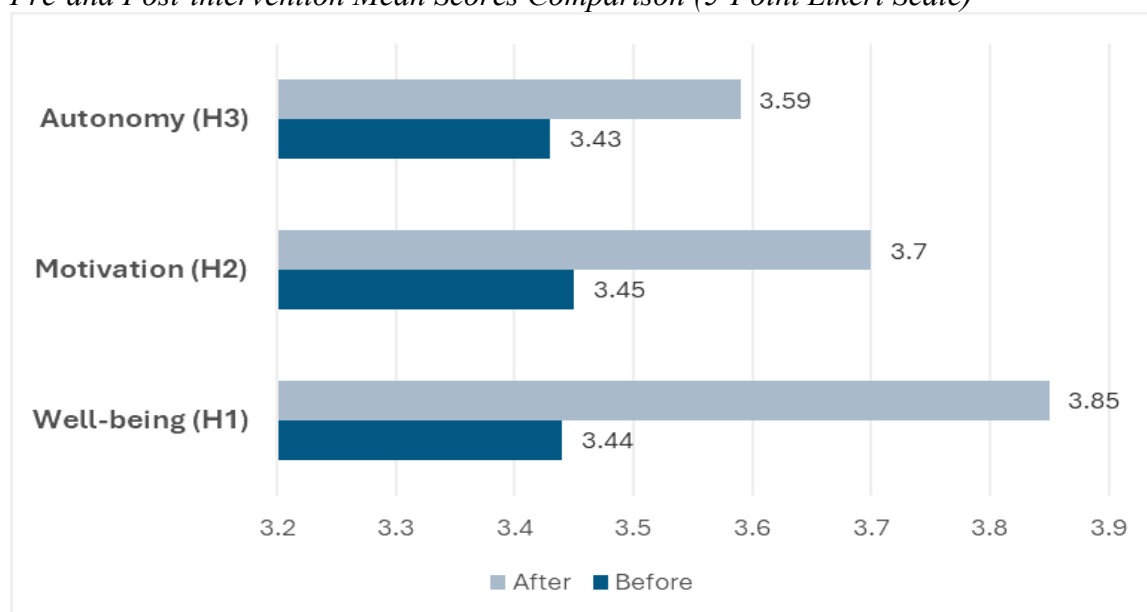
### *Visual Comparison of Pre- and Post-intervention Results*

Among the three measured domains, motivation emerged as the most responsive, indicating that interactive, feedback-rich learning environments enhanced by AI tools significantly increased all dimensions and showed marked improvement following the intervention.

Figure 4 illustrates a bar graph comparing pre-intervention and post-intervention scores across the three measured domains: motivation, well-being, and autonomy. The most pronounced improvement was observed in motivation, followed by well-being and autonomy. The consistency of these results provides empirical support for the effectiveness of AI-supported gamified tools in fostering learner engagement, emotional security, and autonomous self-regulation in ESP environments.

**Figure 4**

*Pre-and Post-intervention Mean Scores Comparison (5-Point Likert Scale)*



Source: Authors

The trends presented in Figure 4 were statistically confirmed, providing empirical support for all three hypotheses. The analysis revealed a statistically significant increase in the post-intervention mean values for autonomy (H3), motivation (H2), and well-being (H1).

## Discussion, Limitations, and Conclusion

The findings demonstrate that integrating AI-supported gamified tools into soft-skills training can substantially enhance learners' psychological well-being, motivation, and autonomy in tertiary ESP instruction. Among the three domains examined, motivation emerged as the most responsive to the intervention, underscoring the influence of interactive, feedback-rich, and goal-oriented environments on sustained learner engagement and task focus. These results are consistent with previous research on AI-enhanced language learning (e.g., Bai & Li, 2024; Gkonou & Mercer, 2022), which confirms that technology-mediated feedback can strengthen both motivation and emotional resilience.

Improvements in psychological well-being suggest that the intervention fostered an emotionally safe and supportive classroom climate, a crucial factor in building students' sense of belonging and promoting active participation. The more moderate gains in autonomy reflect the inherently gradual development of self-regulatory and metacognitive capacities, which typically require extended practice and guided reflection. These findings align with Self-Determination Theory (Deci & Ryan, 2017; Vansteenkiste et al., 2020), indicating that motivation tends to respond rapidly to supportive pedagogical interventions, whereas autonomy and emotional resilience develop more gradually.

Despite these promising outcomes, several limitations should be acknowledged. First, the relatively short duration of the intervention (13 weeks) may have constrained the full development of autonomy-related outcomes. Second, the study relied primarily on self-reported measures, which are inherently susceptible to perceptual and social desirability biases. Finally, the absence of a control group limits direct comparison with traditional ESP instruction and reduces the ability to fully isolate intervention effects.

Future research should examine the long-term impact of AI-supported soft skills training on learner development; incorporate control or comparison groups to strengthen causal inference; explore discipline-specific adaptations of the framework across diverse tertiary contexts; and investigate the transferability of skills to real-world environments.

### *Ethical Considerations*

The study followed the ethical standards of the University of Žilina Research Ethics Committee. Participation was voluntary, and informed consent was obtained from all participants prior to data collection. All responses were anonymised and used solely for research purposes in accordance with GDPR regulations.

## Conclusion

This study provides empirical evidence that integrating AI-supported, gamified tools into ESP instruction can meaningfully enhance learners' motivation and psychological well-being. The results confirm that such interventions foster not only linguistic competence but also emotional and self-regulatory capacities. Motivation emerged as the most responsive, feedback-rich, and goal-oriented domain in sustaining learner focus. Improvements in well-being indicate that the intervention created an emotionally safe and supportive learning climate that encouraged reflection and collaboration. Autonomy, though developing more gradually, showed measurable gains, confirming that metacognitive and self-regulatory skills require continuous, guided practice.

By aligning the conceptual framework and applying digital tools such as Coach.me, Daylio, and SuperBetter, this study introduces a pedagogically grounded framework for AI-enhanced ESP. The findings support a shift from purely linguistic-focused curricula toward holistic, soft-skills–infused approaches that nurture lifelong learning capacities. For today’s digital-native students, technology is deeply embedded in social and relational practices. Therefore, educational systems must develop learners’ ability to critically interpret information from diverse digital sources while maintaining a balance between technological engagement and personal well-being (Benvenuti et al., 2023).

Overall, the study contributes to the growing body of evidence advocating for integrative, future-ready ESP pedagogy that harmonises emotional, cognitive, and behavioural dimensions of learning to prepare students for the challenges of the digital era.

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### **Declaration of Generative AI and AI-Assisted Technologies in the Writing Process**

The authors acknowledge the use of AI tools for language editing, grammar correction, and paraphrasing in preparing this manuscript. All AI-assisted content was reviewed and revised by the authors. AI tools were not used for data generation, analysis, or interpretation. Selected visual materials (Fig. 1, Fig. 2, Fig. 3) were generated by AI-based image generation tools.

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