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Chapter 4

The Impact of AI-Enhanced Learning Activities on Language Learners' Motivation

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Introduction

With our chapter, we contribute to this book, *Generative Artificial Intelligence in Higher Education*, by exploring how incorporating generative artificial intelligence (GenAI) into learning activities impacts student motivation in an English for Academic Purposes (EAP) course. The EAP course is a first-year credit-bearing undergraduate course at one of Australia's Group of Eight research-intensive universities. The course aims to develop academic English skills, specifically among first-year English as an Additional Language (EAL) students. We conducted a small-scale pilot study with this EAL student cohort in Semester 1, 2024. We designed and implemented six AI-enhanced learning activities to test our activity designs, methods and implementation procedures, mirroring the six levels of Bloom's Taxonomy (Bloom et al., 1956). At the end of each activity, we collected real-time student responses by conducting a series of online questionnaires containing a set of questions linked to self-regulated learning and motivation. Our use of real-time data collected immediately after the activity (rather than later) distinctively differs from past studies on student motivation (e.g. Almousaed et al., 2023; Chiu et al., 2023; Kessler et al., 2012; Jia et al., 2022; also see Bodnar et al., 2016 for an extensive overview).

This chapter will showcase how our AI-enhanced learning activities can influence student motivation — especially in light of the recent Digital Education Council's (2024) Global AI Student Survey outcomes, which sought university students' opinions on using AI in higher education. Of 3,839 respondents from 16 countries, 86% declared that they use AI for diverse purposes in their university studies. Nonetheless, 58% of these students claimed that they did not have sufficient knowledge and

skills to properly use AI tools. As a result, the survey found that most respondents (72%) would expect their tertiary institutions to provide adequate training to effectively use AI tools. Moreover, in terms of improving AI literacy support, the results also show that students agreed (31%) and strongly agreed (41%) that their university *"should offer more courses on AI literacy"* (Digital Education Council, 2024, p. 12). These results justify the need for our study to investigate the impact of incorporating GenAI into learning activities on university students, most of whom have recently started their learning journey in a predominantly English-speaking context.

In the fast-evolving landscape of contemporary higher education, the accessibility and advancement of AI-powered tools have opened up new possibilities for students. As evidenced by recent studies (e.g. Li et al., 2024; Li & Bonk, 2023; Li, Kou & Bonk, 2023; Almousaed et al., 2023), these tools are not just a passing trend but a transformative force that is here to stay. Therefore, teaching students how to utilise these tools effectively becomes vital for their success in higher education. More specifically, in the field of second language — henceforth L2 — learning and teaching, a wide range of AI-powered writing tools can instantly provide EAL students with an opportunity to reflect upon an unlimited amount of grammatically correct texts. These tools can generate seemingly eloquent, native-like texts (although they can be false) at their disposal (Liu et al., 2024). Alarmingly, however, we argue that this could potentially reduce the perceived need to develop their academic English skills in their first year at the university.

Furthermore, EAL international students tend to engage less in deep learning and more in surface learning, often because of their underdeveloped English proficiency, causing less confidence in expressing opinions and ideas (Han, 2023). A deep learning approach typically involves critical analyses of new information and relating and integrating new ideas to existing knowledge by comparing and applying, whereas a surface learning approach characteristically draws upon reproductive memorisation-based strategies and rote learning to reproduce the content (Enomoto, 2012; Enomoto & Warner, 2013). In particular, studies have documented Asian EAL international students' tendency to engage in surface approaches to learning as an ongoing challenge for both these EAL students and university educators (Cho et al., 2021; Sakurai et al., 2014; Chue & Nie, 2012). This situation, compounded by the emergence

of GenAI, led us to identify the need to innovate the EAP course curriculum with the following two goals:

1. Develop EAL students' AI literacy so that students can appropriately utilise AI-powered tools in learning processes, maintaining academic integrity and ethical practices.

2. Facilitate EAL students' deeper learning so that students can effectively develop their academic English skills using higher-order thinking skills and metacognitive strategies.

To achieve these goals, we developed six learning activities during which EAL students purposefully work with a GenAI chatbot, ChatGPT-3.5 (Generative Pre-trained Transformer by OpenAI), supported by carefully designed scaffolds embedded within the already existing curriculum created by colleagues over the years of the EAP course life (to be detailed in Section 2). Kember et al.'s (2008) study on output-based education has shown that an output-based teaching approach increased student engagement and intrinsic motivation and encouraged a deep approach to learning. Therefore, in our study, rather than drawing on the input-based education paradigm (cf. Enomoto et al., 2023), the six learning activities are designed within the output-based education paradigm that focuses *"on the activities and tasks completed by students during the learning process through the practical application of knowledge and skills"* (Enomoto et al., 2023, p. 11). Thus, this chapter presents practical examples, recommendations, and instructional steps for designing AI-enhanced learning activities.

We view the increasing accessibility of AI-powered tools as a positive opportunity — rather than an unavoidable threat to academic integrity and ethical practices — for EAL students to improve their academic English skills and stimulate their meta-cognitive processes, resulting in increased intrinsic motivation, deeper learning, autonomy and self-regulation. As we detail in Section 2, these resulting aspects have formed part of the six motivational constructs we investigated through our questionnaires (see Section 2). As Enomoto and Warner (2023, p. 83) state:

> *"…we should not underestimate the potential positive impacts of AI-enhanced technologies on learning and teaching…we can encourage students to embrace and use AI tools as part of their independent learning skills, with the proviso that they must exercise their human dimension, including*

> *the ability to make sound judgements and interrogate through critical thinking and ethics when engaging with AI technologies".*

From this standpoint, taking on board Henry and Lamb's (2019) proposition, this chapter maps *"the affordances associated with digital technologies, and in the conceptualisation of learner responses to these innovations"* (p. 613) to understand *"the ways in which contact with the TL [target language] in digital spaces can function to generate idealised images of the self-engaged in TL-use"* (p. 607). Thus, referring to motivation as a stimulated process of generating the 'self-engaged', in this chapter, we describe how we utilise ChatGPT to enhance EAL students' motivation to develop their academic English skills in the EAP course.

Chapter overview and key takeaways

Section 1 provides a brief overview of computer-assisted/technology-enhanced L2 learning and teaching, including recent studies on AI-powered tools such as ChatGPT. We examine relevant literature, specifically focusing on increasing student motivation and autonomy in L2 learning. Then, Section 2 details how we designed and implemented AI-enhanced learning activities in the first-year EAP course to develop EAL students' academic English skills. This is followed by Section 3, in which we analyse students' responses from a series of real-time online questionnaires collected immediately after each AI-enhanced learning activity. Finally, in Section 4, based on this pilot study's findings, we explore how the delivery of our AI-enhanced learning activities could be improved to be implemented on a larger scale before we conclude our chapter.

Reading our chapter, you will gain the following three insights:

1. How AI-enhanced learning activities can impact EAL students' motivation.
2. Practical examples of AI-enhanced learning activities design and implementation.
3. Recommendations and instructional steps for designing and embedding AI-enhanced learning activities within a curriculum following a revised version of Bloom's Taxonomy (Bloom, 1956, revised by Krathwohl, 2002).

Section 1: The background to our study

Today's rapid evolution of technology has undeniably increased L2 students' exposure and access to a wide range of authentic online L2-based resources, such as websites, interactive learning videos, games, apps and, most recently, AI-powered tools (see the Digital Education Council Global AI Student Survey, 2024). However, as D'Orazzi's recent studies (2020a; 2024b) show, readily accessible technologies can play both motivational and demotivational roles in formal L2 learning environments. Thus, with the emergence of GenAI, Chiu et al. (2023) call for a deeper exploration of the utilisation of AI-powered tools in contemporary L2 classrooms, particularly in response to the academic integrity and ethical practice challenges posed by such tools within the context of L2 instruction. One way to overcome such challenges is to develop EAL students' AI literacy by explicitly teaching them how to use AI-powered tools in a way that would not hamper their academic integrity and ethical practices (see Hafthorsson et al., 2024 in this book for further discussion on ethical considerations). Before we introduce our pilot study in Section 2, in this section, we discuss past studies (including both pre-ChatGPT and post-ChatGPT) on computer-assisted language learning (CALL) and technology-enhanced language learning (TELL). Here, we note that CALL and TELL can often appear interchangeably in the L2 literature.

The pre-ChatGPT (before November 2022) body of literature on CALL and TELL has focused largely on the role of technology in L2 learning and how it can be utilised in L2 classrooms. For instance, Bodnar et al. (2016) comprehensively examined 22 studies on CALL within L2 teaching contexts. By examining the motivational effects of digital tools, their work contributes significantly to our understanding of how CALL can be effectively applied to pedagogical approaches. Similarly, Spector and Park (2017), examining motivation research and its application for learning design and instruction, also provided practical instructional steps to improve learner motivation using educational technologies. Drawing on the framework of situated learning constructs (e.g. Ushioda, 2009), Bodnar et al. (2016) also advocated for longitudinal studies that examine shifts in student motivation 'over time' within specific contextualised settings. On the other hand, there has been a paucity of studies that measure students' motivation while pursuing action (or learning

activities). This research gap prompted us to develop six distinct questionnaires for collecting students' real-time reactions to the six activities (see Section 2).

Similarly, in the pre-ChatGPT literature, examining the relationship between educational technology and L2 learning motivation, Henry and Lamb (2019) reported that CALL approaches not only cultivate 'intrinsic' motivation to pursue L2 learning, but also promote learner autonomy. For example, in their comprehensive review, Henry and Lamb (2019) analysed various studies, including Cruaud's (2016, as cited in Henry & Lamb, 2019) study on the positive motivational impact of video game activities in French classrooms in Norway. These past results shed light on students' strong engagement with games similar to those they commonly played in their leisure time at home. Likewise, Liu and Chu (2010), incorporating computer games in their L2 research, reported that participants experienced a heightened sense of positive emotions and improved L2 communicative competence. Concurring with these findings, Ryan and Deci (2020) propose, when examining the role of technology in the L2 classroom, that it is important to consider three fundamental psychological needs of L2 learners as follows:

- Autonomy — refers to the desire for one's agency to feel in control of their own behaviours and goals.
- Competence — involves feeling effective and capable of achieving desired outcomes.
- Relatedness — refers to the need to feel connected and valued in relationships with others.

The above Ryan and Deci's (2020) proposal is based on the self-determination theory of motivation (Deci & Ryan, 2000), and it provides a theoretical framework that human motivation is driven by the goal to fulfil these three psychological needs. L2 learners can increase intrinsic motivation and autonomy when these needs are met. Thus, the focus of our pilot study is to investigate how AI-powered tools, such as ChatGPT, can help meet these L2 learners' psychological needs to increase their motivation.

Moving forward into the GenAI era, well-developed AI literacy has the potential to benefit today's generation of university students and their

lifelong learning because their exposure and access to emerging technologies will continue beyond their university studies into their workplaces and future lives. In the L2 learning and teaching field, research has shown that fostering AI literacy can help improve L2 learner motivation, leading to autonomy — especially within online learning environments — complementing the content covered in traditional L2 classroom settings. For example, the integration of AI-generated feedback into L2 assessments and practice opportunities can serve as an enabler for students to increase both their motivation and autonomy across diverse L2 learning contexts, especially where a greater degree of flexibility with their learning is needed (Jia et al., 2022; also see Nygaard, 2024 in this book on the use of AI-generated feedback).

At the same time, however, educators should also be mindful that "*empirical studies on AIEd [AI education] in schools are scarce [and] how teachers use AI technologies pedagogically, and their roles in learning in classrooms remain unclear*" (Chiu et al., 2023, p. 3). Indeed, when incorporating AI-powered tools into the design of learning activities, it is necessary for educators to proactively identify potential pitfalls and how pedagogical strategies could mitigate them. For instance, students might misuse such tools to generate work without sufficiently understanding the content, as they become over-reliant on them (cf. Popenici & Kerr, 2017). As noted above, students are eager to learn more about the appropriate and effective use of AI to enhance their university studies (Digital Education Council, 2024). In this regard, our pilot study contributes to the literature by identifying possible difficulties of using AI-powered tools in a tertiary EAL context.

In the post-ChatGPT literature, Chiu et al. (2023) found that students 'intrinsically' enjoyed using AI chatbots during class activities, especially when they were supported by appropriate teacher scaffolding and comprehensive explanations of specific activities' rationale, purpose, and benefits. Interestingly, their distinction between novel and advanced learners, however, revealed that advanced learners did not always enjoy or favour teacher scaffolding; instead, they preferred greater 'learner autonomy' in actioning instructions. As a result, these findings crucially informed the design thinking process and delivery of our study's AI-enhanced learning activities in determining an optimum amount of teacher scaffolding and activity explanations.

Indeed, recent post-ChatGPT studies have examined the significance of learner autonomy for effectively using AI-powered tools in L2 learning and demonstrated that cultivating L2 learner motivation through educational technology can promote autonomy in self-directed L2 learning. For instance, Li, Bonk and Zhou (2023) explored the requisite self-management skills that L2 learners need when using the AI-powered Duolingo™ app beyond a formal L2 classroom context. Their findings highlight the significance of exercising autonomous, self-regulated learning skills for defining and setting specific learning goals as the key to advancing their L2 progress. Similarly, focussing on the effect of educational technology on self-directed, autonomous learning, Li and Bonk (2023) also investigated the impact on self-directed L2 learning of using the AI-powered Duolingo™ outside formal L2 classroom settings. Their study found that Duolingo™ L2 learners are driven mostly by their 'intrinsic' motivation (e.g. interests in culture rather than grades). Li and Bonk (2023) reported that the Duolingo™ learners exercised self-monitoring skills by gauging their own understanding and evaluating the content during their learning process, keeping track of their progress and monitoring their performance to advance their learning. These findings from the Duolingo™ studies strongly point to the significant role of AI-powered tools in increasing motivation and promoting learner autonomy.

With respect to applying ChatGPT to L2 teaching, Li, Bonk and Kou (2023) examined the multilingual applications of ChatGPT across 18 languages on the YouTube platform to explore its educational affordances for L2 teaching. Their findings revealed that, whilst ChatGPT is valuable as an L2 teaching tool, it cannot totally replace human teachers as it still lacks complex, sophisticated human dimensions. Similarly, Li, Kou and Bonk (2023) examined how YouTube content creators (who are online L2 educators) use ChatGPT to teach languages online. By conducting the content analyses of 140 videos, using a mixed quantitative and qualitative method approach, their study identified four major categories of YouTube content creators (L2 educators) based on their pedagogical implementations and perspectives. Most recently, Li et al. (2024) investigated the perceptions of 14 prominent YouTube-based L2 educators on self-directed L2 learning using ChatGPT and analysed in-depth interviews with them. Their thematic analyses have shown that these online educators view ChatGPT as a transformative tool for enhancing not only L2 learning

experiences but also self-directed L2 learning. Based on students' experiences, these educators were found to support fostering self-directed L2 learning by utilising ChatGPT-generated authentic, meaningful conversations that L2 learners could easily access and engage in.

In summary, these research findings clearly indicate that cultivating motivation through educational technology can positively feed into promoting learner autonomy. With well-developed AI literacy using a GenAI chatbot, such as ChatGPT, students can potentially transform their learning journey into more autonomous, curiosity-driven academic exploration, as strongly requested by the large majority of the Digital Education Council's (2024) survey participants across multiple universities located in 16 countries. In 21st-century higher education, such AI literacy and associated exploration skills should be explicitly developed to become transferable to other study and workplace contexts.

Section 2: AI-enhanced learning activities

In this study, we use the term 'AI-enhanced' learning activities rather than 'AI-assisted' learning activities. We view that the former encapsulates a more cognitivist (and a less behaviourist) view of L2 learning than the latter (see Enomoto et al., 2022, for further discussion of cognitivism and behaviourism paradigms; Dobozy & Szabo, 2024 in this book on the view against behaviourist AI pedagogies). Drawing on the cognitivist view of learning (e.g. Piaget, 1936, 1958; Bloom et al., 1956) and the constructivist view of scaffolding (Vygotsky, 1967, 1978; Bruner, 1971), our focus is on designing student-centred learning activities that can improve EAL students' motivation, active engagement, and curiosity-driven exploration to construct their own language learning experiences — enhanced by the meaningful utilisation of GenAI. We designed six AI-enhanced activities for the first-year EAP course in Semester 1, 2024 (from 26 February to 26 May 2024). ChatGPT was their primary AI-powered tool for all six activities because it is a real-world tool that can increase students' sense of authenticity and relevance to their current lives, positively influencing their motivation and engagement with learning activities (Enomoto, 2012).

Before participating in the study, student participants were provided with a Plain Language Statement outlining various phases and objectives

of the study. This was done to ensure that they fully understood 1) the phases and purposes of the study and 2) the potential benefits of GenAI application in their L2 learning. Following approval from the University Human Ethics Committee, student participants were requested to provide written consent, granting authorisation for the authors to utilise their responses from six short questionnaires for research purposes. Of the student cohort, 73% (*N*= 48 out of 66) consented to complete some of the questionnaires. Those who chose not to consent were not required to complete any questionnaires, but they were included and engaged in AI-enhanced Activities 1-6 exclusively as part of the EAP course and for their own educational benefit.

The EAL students had a minimum English proficiency level equivalent to IELTS score of 6.5 as a university admission requirement. In this first-year course, the students were mainly introduced to academic life in Australia via a series of 12 one-hour lectures focusing on topics pertaining to Australian history, society, culture and languages (Table 1). In addition to the one-hour lecture, each week, students attended a one-hour tutorial and a two-hour tutorial — a total of four contact hours per week for 12 weeks. The teachers, in their pedagogy, adopted an active, communicative L2 learning and teaching approach (see Richards & Rodgers, 2014) in this course, to maximise interactive opportunities for students to use English in a wide range of scenarios and for multiple purposes fit for their new academic life in an English-speaking country such as Australia.

Moreover, both task-based and content-based instructional approaches that the teachers purposefully adopted also allowed these students to focus on 'meaning' (see Long, 2015; Ellis, 2017). Through these instructional approaches, in addition to improving their linguistic 'forms' in English, students can also focus on the 'meaning' of the Australian sociocultural context where they would potentially spend the subsequent three or more years of their academic life. Of the lecture topics listed in Table 1, students could select any of these same topics for AI-enhanced Activities as well as for their individual final written assignment and group oral presentation. Although the various pieces of assessment were not part of this study, selecting the same topic could potentially boost a stronger sense of confidence, purpose and motivation for completing all tasks proposed during the semester.

Lecture socio-cultural topics	Time of delivery
Cultural Diversity and Identity in Australia	Weeks 1 & 2
Indigenous People of Australia	Weeks 3 & 4
White Australia policy and migration	Week 5
Irish and British migration in Australia	Week 6
Italian migration in Australia	Week 7
Greek migration in Australia	Week 8
Lebanese migration in Australia	Week 9
Chinese migration in Australia	Week 10
Vietnamese and Indian migration in Australia	Week 11
Development of Australia as a multicultural society	Week 12

Table 1: Lecture socio-cultural topics.

The majority of student participants had just arrived in Australia from their home countries for their first semester at the university. Informed by past student feedback, we identified that international EAL students are likely to:

1. find it very useful and interesting to learn subject matters pertaining to a diverse range of cultures and communities (D'Orazzi, 2024c; Marangell & D'Orazzi, 2023); and

2. consider practical tutorials essential for learning how to use online learning tools necessary to succeed in all their studies (Enomoto, 2012; Enomoto & Warner, 2018).

In addition to developing the four core skills of reading, writing, listening, and speaking, teachers also devoted part of the tutorials to unpacking concepts such as 'academic integrity', 'plagiarism', 'acknowledgment of sources', 'authorship' and 'ethics'. For example, the students learned how to interpret the university's 'Student Academic Integrity Policy' and 'Assessment and Results Policy'. Both policies refer to the use of AI tools (including ChatGPT) and the obligation to cite them as the policies require. Explaining these policies was an opportune starting point to direct students' attention to essential aspects of their academic acculturation process and teach them how to use AI in a way that would not risk their academic integrity and ethical practices.

In this pilot study, we utilised the one-hour tutorials from Week 2 to Week 9 for implementing AI-enhanced Activities 1-6. We structured the course curriculum so that each two-hour tutorial from Week 1 to Week 9 was spent on scaffolding the following weeks' AI-enhanced activities by covering key themes and useful knowledge conducive to effectively undertaking the AI-enhanced activities (see Table 2). In addition, the one-hour Week 1 tutorial was devoted to 1) explaining the course learning outcomes, assessment tasks, and course requirements and 2) unpacking the rationale for incorporating ChatGPT into class learning activities to facilitate students' deeper learning through higher-order thinking skills and meta-cognitive strategies.

	One-hour tutorial	Two-hour tutorial
Week 1	**Overview** of the course (a) learning outcomes; (b) assessment tasks; and (c) course requirements. The rationale for incorporating ChatGPT into class learning activities, including the aims of the AI-enhanced activities project.	**Scaffolding for AI-enhanced Activity 1:** Discuss guidelines on the use of AI for learning purposes, including biases, unpredictability, and misinformation that can be generated by AI. Introduce Activities 1-6 and unpack their benefits, showing how they will progress along Bloom et al.'s (1956) revised Taxonomy (Krathwohl, 2002). The rationale for incorporating ChatGPT into class learning activities, including the use of online surveys.
Week 2	**AI-enhanced Activity 1: Use of AI for vocabulary building**	**Scaffolding for AI-enhanced Activity 2**: Skimming and scanning strategies when reading academic research. *Meet your Librarian* session: Methods and tools to find reliable and academic sources online.
Week 3	**Scaffolding for AI-enhanced Activity 2:** Reflections on the skills session with the librarian.	**Scaffolding for AI-enhanced Activity 2**: Critical reading, and reputable and peer-reviewed sources evaluation. Strategies on how to incorporate sources into academic writing.

	One-hour tutorial	Two-hour tutorial
Week 4	**AI-enhanced Activity 2: Use of AI for reading skills enhancement**	**Scaffolding for AI-enhanced Activity 3**: Reflection on academic integrity and plagiarism. Referencing, paraphrasing and integrating sources into writing. *Meet the Academic Skills Services* workshop: Tricks on how to improve academic writing.
Week 5	**AI-enhanced Activity 3: Use of AI for writing skills enhancement**	**Scaffolding for AI-enhanced activity 4**: Academic writing process, paragraph structure, summary writing, paraphrasing, referencing and integrating sources.
Week 6	**AI-enhanced Activity 4: Use of AI for analytical thinking**	**Scaffolding for AI-enhanced Activity 5**: Linking ideas and building an argument, synthesising information and sources key points. Writing introductions and conclusions, writing an essay.
Week 7	**Extra-curricular activity:** Cultural activity as part of the EAP course.	**Scaffolding for AI-enhanced Activity 5**: Editing and proofreading. Peer feedback on written tasks.
Week 8	**AI-enhanced Activity 5: Use of AI for evaluation and peer feedback**	**Scaffolding for AI-enhanced Activity 6**: Developing oral presentation skills using sources and referencing. Drafting an oral presentation outline and demonstrating critical thinking.
Week 9	**AI-enhanced Activity 6: Use of AI for oral presentation**	

Table 2: Weekly tutorial schedule designed for implementing AI-enhanced activities.

After each activity, student participants completed one questionnaire using an online survey tool, Qualtrics XM™. At the beginning of each of the six questionnaires, participants inserted the last three digits of their mobile number to trace their participation across the six activities and, at the same time, to guarantee their anonymity. As Table 3 shows, each of the six questionnaires for Activities 1-6 contained a set of theory-underpinned

motivation-linked questions that allowed us to investigate the student motivational patterns and attitude(s) emerging from using ChatGPT in an EAP learning context. In addition, there were also six other sets of questions that were linked to the below six motivational constructs in each of the six questionnaires:

1. Self-regulated learning (Black & Deci, 2000, as cited in Chiu et al., 2023).
2. Digital literacy (Ng, 2012; Prior et al., 2016, as cited in Chiu et al., 2023).
3. Intrinsic motivation (McAuley et al., 1989, as cited in Chiu et al., 2023).
4. Autonomy satisfaction (Chiu et al., 2023).
5. Competence satisfaction (Chiu et al., 2023).
6. Relatedness satisfaction (Chiu et al., 2023).

EDUCATIONAL OBJECTIVES	Likert scale question items designed by the authors for each of the six activities
Activity 1: Vocabulary building	This activity improved my memory capacity.
	This activity helped me judge which words could be useful to analyse and discuss my topic.
	This activity helped me understand how to ethically use AI to my own benefit.
Activity 2: Reading skills	This activity improved my reading skills.
	This activity helped me find relevant sources.
	This activity helped me develop skimming and scanning techniques.
Activity 3: Writing skills	This activity improved my writing skills.
	This activity helped me better integrate sources into my text.
	This activity helped me better understand what plagiarism means.

EDUCATIONAL OBJECTIVES	Likert scale question items designed by the authors for each of the six activities
Activity 4: Critical thinking	This activity improved my critical thinking.
	This activity helped me develop synthesis writing skills.
	This activity helped me reflect on the structure of my paragraphs.
Activity 5: Peer reviewing	This activity improved my evaluative skills.
	This activity helped me better reflect on the role of peer-reviewing.
	This activity helped me increase my confidence in giving feedback and suggestions.
Activity 6: Speaking skills	This activity improved my speaking skills.
	This activity helped me better reflect on the role of academic integrity.
	This activity helped me increase my confidence in creating PowerPoint slides.
FIVE MOTIVATIONAL CONSTRUCTS	**Likert scale question items**
Self-regulated learning skill	I actively participated in learning English language because a solid understanding of English language is important to my intellectual growth.
	I am likely to follow my teacher's suggestions for studying English language, because they have insight about how best to learn the language.
	The reason that I worked to expand my knowledge of language is because it is a challenge to really understand how to apply English language in my academic career.

FIVE MOTIVATIONAL CONSTRUCTS	Likert scale question items
Digital Literacy	I learnt new technologies easily.
	I am confident with my search and evaluation skills in regard to obtaining information from AI.
	I am familiar with issues related to AI-enhanced activities.
	Technology enabled me to collaborate better with my classmates on project work and other learning activities.
Intrinsic motivation	I enjoyed learning with AI very much.
	Learning with AI was fun.
	I would describe learning with AI as very interesting.
Autonomy satisfaction	I felt a sense of choice and freedom in the learning activity I undertook.
	I felt that the AI-enhanced learning activity satisfied my expectations.
Competence satisfaction	I felt competent to achieve my learning goals.
	I felt confident that I learned the topic well.
Relatedness satisfaction	I felt supported by my teachers during the AI-enhanced activities in the classroom.
	I felt supported by my classmates during the AI-enhanced activities in the classroom.
	I felt safe to ask questions, receive feedback and make mistakes.

Table 3: 5-point Likert scale question items contained in the six questionnaires.

To collect real-time motivation-linked responses, we designed and developed AI-enhanced Activities 1-6, theoretically underpinned by Bloom et al.'s (1956) Taxonomy revised by Krathwohl (2002). Drawing on the

output-based education paradigm (Enomoto et al., 2023), each of the six Activities corresponded to the six different levels of Bloom's Taxonomy (Figure 1) to develop specific L2 skill sets during each activity.

Before starting each AI-enhanced learning activity, the teachers gave students comprehensive explanations — scaffolding — to maximise the pre-set learning outcomes they are expected to achieve at the end of each learning activity. Moreover, students could choose the same topic for their individual final written assignment and group oral presentation, increasing their sense of purpose and relevance. Consequently, they felt ownership of and relatedness to all six AI-enhanced activities, contributing to fulfilling the aforementioned fundamental needs of L2 learners: autonomy, competence, and relatedness proposed by Ryan and Deci (2020). Further, particular attention was devoted to the classroom learning climate, where students could either converge towards novelty or diverge if they did not fully engage with class content. Therefore, we systematically and carefully presented this pilot project to the class, guiding students step by step to ensure students understood the rationale and the benefits of each GenAI-enhanced learning activity, which we detail below.

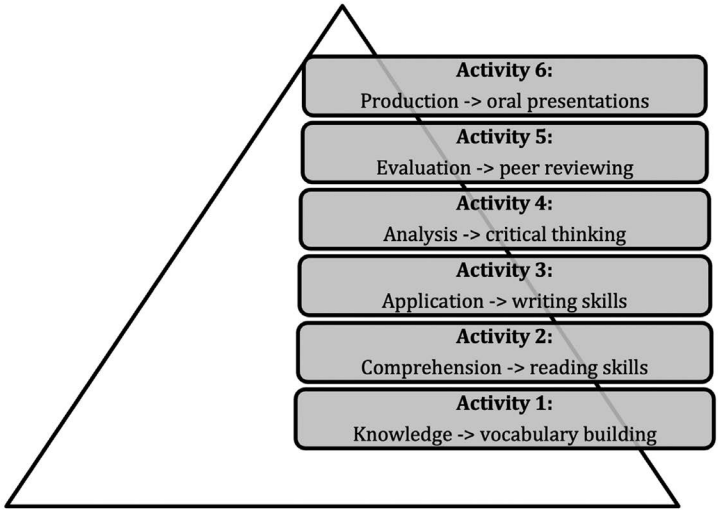


Figure 1: Visual mapping of a revised Bloom's Taxonomy of educational objectives (Bloom, 1956, revised by Krathwohl, 2002).

Activity 1 (Knowledge: Vocabulary building)

Activity 1 aimed to increase and broaden students' knowledge of relevant terminology so that they could understand and write about a specific socio-cultural research topic. Students were asked to form small groups of three to four and 'choose' one topic per group from the topics shown in Table 1. This was done to enhance their ownership of and relatedness to their chosen research topic (cf. Ryan & Deci, 2020). In light of Bloom et al.'s Taxonomy (1956, pp. 63-64), *"the most basic type of knowledge in a particular field is its terminology"*. Students were required to build up relevant terminology with the support of ChatGPT, which suggested vocabulary and clear definitions of associated terminology relevant to their self-chosen topic.

Of the ChatGPT-generated suggestions, students were asked to select the most relevant and useful vocabulary or terminology for their research topic and then to design their own vocabulary list, reinforcing *"a sense of acting in a manner congruent with modes of participation characteristic of online interactions integral to contemporary life"* (Henry & Lamb, 2019, p. 608). According to Bloom et al. (1956, pp. 62-63), remembering is *"a much more complex process of relating, judging, and reorganising"*, during which students had to "*isolate bits of information*" relevant to the specific area of expertise they wanted to research. Thus, in Activity 1, building on the initial suggestions generated by ChatGPT, students undertook the process of relating, judging and recognising to create their own vocabulary list appropriate for them to use in researching and discussing topics related to Australian history, society and culture — in a way that would help them decode the texts they were going to read in Activity 2.

Activity 2 (Comprehension: Reading skills)

Activity 2 helped students improve their skills in searching for reputable and peer-reviewed sources that could usefully scaffold their research for completing their individual final written assignment and group oral presentation. ChatGPT was utilised to find suitable readings on the specific topic that each small group decided to focus on. ChatGPT generally produced a long list of sources that students considered to build up their understanding of the general themes connected to their research topic,

but also the multiple factors influencing the dynamics relevant to their topic. Notably, Bloom et al. (1956) allude to the option of using translation tools to fully comprehend sources as *"a transitional position between the behaviors classified under the category of knowledge and types of behavior described under the headings of interpretation, extrapolation, analysis, etc."* (p. 91). However, students were asked not to translate texts into/from their native languages. This decision was made because the vocabulary list students created for themselves during Activity 1 was expected to play a significant role in scaffolding their reading comprehension and decoding of original texts written in academic English.

During Activity 2, by developing skimming and scanning skills, students selected the most appropriate and reputable sources that ChatGPT gathered and generated for them. Students could reflect on themes connected to the appropriateness of peer-reviewed reputable journals and the quality of the studies they wanted to utilise to design their research. Based on Bloom's Taxonomy (1956), at the comprehension level, students were *"expected to know what is being communicated and to be able to make some use of the material and ideas contained in"* the sources they selected (p. 89). This comprehension level required students to interpret sources and fully understand concepts and dynamics necessary to formulate research questions in later activities. As with Activity 1, students needed to critically judge the validity and quality of the sources found by ChatGPT and utilise them for their own benefit. At the same time, students applied their skimming and scanning skills to interpret what they were reading, given that *"interpretation also includes competence in recognising the essentials and differentiating them from the less essential portions or from the relatively irrelevant aspects of communication"* (Bloom et al., 1956, p. 93).

Activity 3 (Application: Writing skills)

Students were explicitly taught several strategies on how to integrate sources in their writing and how to paraphrase them in previous tutorials. In the preceding tutorials, students also had learned how to link ideas and build arguments using relevant resources produced by academic writing experts in the Academic Skills Services at the university. The teachers explained how to synthesise different sources and use reporting

verbs and linking words to validate their ideas, and also how to contrast other researchers' ideas, so that they could effectively express ideas and concepts in their own writing.

In the one-hour Activity 3 tutorial in Week 5, students were instructed to make effective use of 1) the vocabulary list produced in Activity 1, and 2) the sources selected in Activity 2. Thus, during this application level, they applied *"the skills and abilities which are lower in the classification order"* of Bloom's Taxonomy (1956, p. 120). Students were asked to write their own synthesis text — a 500-word text in which they synthesised the content of the sources (around two/three sources) that they selected during Activity 2. To do so, they autonomously (as a group) fed ChatGPT with information that they wanted to include in their synthesis. After ChatGPT provided them with a synthesis of the selected sources' texts, they had to analyse what ChatGPT produced and then reword the whole synthesis, avoiding plagiarism to produce an original synthesis text. Students critically analysed the ChatGPT-generated content in terms of its accuracy, coherence, and — notably, potential biases that ChatGPT could present.

Students decoded the text produced by ChatGPT and started to model its language whilst making use of the understanding of their topic gained in Activities 1 and 2. This application level involved them inserting reporting verbs, linking words, and paraphrasing strategies, which students learned in the separate tutorials that took place in the preceding weeks. Students worked with the sources to verify that the ideas used by ChatGPT matched those emerging from the two or three sources they used in their own synthesis. While applying these different sets of skills, Activity 3 was designed to improve students' *"attitudes toward work"* and develop *"proper attitudes of self-confidence and control"* (Bloom et al., 1956, p. 122). The use of technology for writing activities was also part of Kessler et al.'s (2012) and Lamb and Arisandy's (2020) studies, which found that students who were engaged in collaborative writing in online spaces experienced a boost in intrinsic motivation.

Activity 4 (Analysis: Critical thinking)

During Week 6, Activity 4, students conducted a meta-analysis of both the text they produced and the text ChatGPT had generated during the

previous Activity 3. Students identified the structures they used to convey meaning and the efficacy of using them. While applying all skills accumulated in the first five weeks of the semester, students provided evidence of having acquired the capacity *"to distinguish relevant from extraneous material, to note how one idea relates to another, to see what unstated assumptions are involved in what is said, to distinguish dominant from subordinate ideas or themes […], to find evidence of the author's techniques and purposes, etc."* (Bloom et al., 1956, p. 144). Through Activity 4, students demonstrated their profound engagement, seemingly driven by their curiosity, with the sources and the text generated by ChatGPT to identify its faults and limitations. They also reflected on the language used and how the changes they had applied have contributed to improving their synthesis. Furthermore, they mapped the relationship between arguments and the connection across paragraphs while highlighting the connection between the introduction and the conclusion and analysing if the conclusion was actually summarising the main components of their synthesis.

Following Kessler et al.'s (2012) study, students were asked to collaborate to identify grammatical errors. After a first and second round of meta-textual reflection and reviewing, student participants could provide more accurate syntheses given their extensive correction of errors, such as incorrect use of verb tenses, subject-verb agreement, noun pluralisation, word choice and syntactical structures. Such a fine-grained analysis aimed to increase both students' EAP competencies, autonomy and self-confidence when conducting a meta-linguistic reflection. The particular emphasis on the high-quality syntheses that students aimed to produce validates Storch's (2005) seminal study on collaborative writing. Furthermore, D'Orazzi's (2024a) recent study strongly points to the positive influence of goal setting — one requisite for self-regulated learning — for increasing student motivation in L2 learning, including their acquisition of high-quality language skills by setting very specific goals.

Activity 5 (Evaluation: Peer-reviewing)

Originally, the 'evaluation' level of Bloom's Taxonomy (1956) was the top level in the pyramid. However, as Figure 1 shows, a revision of Bloom's Taxonomy (1956) placed this level under the production level (Krathwohl, 2002). In Activity 5, students were required to evaluate their peers'

synthesis (Activity 3) and their process of modifying ChatGPT-generated texts, which were presented in their peers' written reflections (Activity 4). They evaluated modified texts from other groups and provided "*judgments about the value, for some purpose, of ideas, works, solutions, methods, materials, etc.*" (Bloom et al., 1956, p. 185) identified in their peers' synthesis. Such an activity allowed them to familiarise themselves with the peer-reviewing process, which, consequently, brought about peer learning and collaborative learning (cf. Storch, 2019).

Given that "*only those evaluations which are or can be made with distinct criteria in mind are considered*" (Bloom et al., 1956, p. 186), students were equipped with a series of questions consisting of specific criteria to consider when evaluating their peers' work. Such criteria include: clarity, use of academic English, correct use of reporting verbs and linking words, support of arguments with relevant sources, choice of reputable sources, avoidance of plagiarism, accuracy, appropriate terminology utilised, and internal cohesion and consistency.

Furthermore, in Activity 5, students were reminded to keep in mind three important questions: "*has the writer (or speaker) been consistent in his [sic] use of terms, does one idea really follow from another, and do the conclusions follow logically from the material presented?*" (Bloom et al., 1956, p. 188). In line with Wu et al.'s (2011) research with EAL learners in Taiwan, EAL students in this pilot study benefitted from the comments and suggestions provided by their peers. Such a collaborative approach aimed to help students improve their language skills and make them more self-confident and autonomous language users.

Activity 6 (Production: Oral presentations)

For the final Activity 6, undertaken in Week 9, each group was required to prepare a ten-minute presentation asking ChatGPT to generate PowerPoint slides based on the final version of their synthesis. In light of what students had learnt about plagiarism and academic integrity, they then started to reflect on the effectiveness of the generated slides and created their own captivating versions of them. When this project was designed, we had originally intended to ask groups to video-record their presentation and upload it to a social media site they considered appropriate for the genre and register used in their video. Given the strong

impact of social media on the 21st-century younger generations and the sense of recognition and validation they receive through these channels, this choice was meant to lead students to reflect extensively and deeply on the characteristics of the social media they chose.

Thus, collaborative language learning practices in Activity 6 had originally been designed to motivate students from multiple perspectives. The psychological and motivational impact of these forms of collaboration involved was very promising, as also underlined by Wu et al. (2011), who discovered that these types of activities triggered students' positive emotions and motivation to engage more actively in oral activities. Nonetheless, time constraints did not allow the teachers to complete this activity. Students managed to prepare their Power Point Presentation slides, but did not have enough time to record their presentations and upload them to their preferred social media.

Section 3: The outcome

In this section, we examine and reflect upon students' responses from a series of real-time polls and evaluate the impact of our work with AI-enhanced learning activities on student motivation. The decision to explore students' attitudes and motivation 'during' the AI-enhanced learning activities was inspired by Bodnar et al.'s (2016) observations that past TELL/CALL studies did not accurately capture students' attitudes and motivation because they analysed students' post-activity data. That is, as such data were not collected 'immediately after' students had completed learning activities in the classroom, students tended to rely upon their memory and recollection of activities they had experienced (see also Almousaed et al., 2023; Chiu et al., 2023; Kessler et al., 2012; Jia et al., 2022). Therefore, we conducted a questionnaire at the end of (and immediately after) every learning activity. After completing Activity 1, we asked students to answer ten closed-ended questions to collect some biographical information, as presented in the next section below. To collect quantitative data, we used a 5-point Likert scale ranging from 'strongly disagree', 'disagree', 'neither agree nor disagree', 'agree', to 'strongly agree' to depict students' motivation and attitudes. As Table 3 shows, each of the six questionnaires included: 1) three questions specifically related to each of the six activities and 2) 17 questions, which were

based on Chiu et al.'s (2023) study, to measure students' motivational changes over time. In addition, we also collected qualitative data by asking five open-ended questions given to students at the end of the semester. However, this chapter will focus exclusively on the quantitative data collected.

Results — Student perspective and our reflections

We start by focusing on student perspectives before sharing and discussing our reflections as L2 teachers. As expected, the first questionnaire recorded the highest participation rate. Of the 66 students enrolled in the EAP course, 48 shared their biographical information before providing their responses to the 20 Likert scale question items (Table 3).

These students were enrolled at different faculties, including Faculty of Arts (68.8%), Faculty of Science (14.6%), Faculty of Business and Economics (6.3%) and Faculty of Medicine, Dentistry and Health Science (6.3%). The majority of them were between 22 and 25 years old (54.2%), born in the People's Republic of China (68.8%), and with no long periods of study in English-speaking countries prior to their arrival in Australia (66.7%). The number of years spent learning English before starting the EAP course varied: 1-3 years (10.4%), 4-6 years (14.6%), 7-10 years (25%), and 11 years and above (50%). Multilingualism characterised the English language learning experience of students who (self-)declared to speak: (a) English plus three extra additional languages (6.3%), (b) English plus two extra additional languages (12.5%), (c) English plus one extra additional language (52.1%). Less than one-third of the student participants (29.2%) spoke only English as their additional language. Among the first languages emerging from students' linguistic repertoires, Chinese (Mandarin) was the most spoken language (66.7%), followed by Japanese (12.5%), Chinese (Cantonese) (4.2%) and Vietnamese (4.2%). Furthermore, these students decided to learn EAP for multiple co-existing reasons ranging from the refinement of oral communication (21%) and writing (19%) skills to the improvement of their overall academic performance (17%). Fewer students selected this course to: (a) enhance their oral presentation skills (12.5%), (b) read resources (12.5%), (c) engage in academic discussions (11%), and (d) avoid plagiarism and ensure academic integrity (7%).

As Table 4 shows, descriptive statistical analysis revealed an ingrained interest in understanding how to use ChatGPT effectively and proactively, as also found by the Digital Education Council (2024). Although statistical regression analysis was also conducted, low participation rates for Activity 2 (*N*= 17), Activity 3 (*N*= 14), Activity 4 (*N*= 20), Activity 5 (*N*= 7) and Activity 6 (*N*= 9) did not allow us to deliver rigorous correlations across the different sets of responses. Likewise, students' inconsistencies in providing us with the last three digits of their phone numbers — not their names as required by the Ethics clearance, impeded us from tracing diachronic motivational changes possibly occurring over time. Nonetheless, calculating mean (M) and standard deviation (SD) values provided a practical portrait of the dynamics experienced by students when completing Activities 1-6 (Table 4). Students generally agreed (value 4) or strongly agreed (value 5) that these activities helped them improve their academic skills, strongly indicating that most of the participants considered these six activities very effective, beneficial and productive.

Activity	Likert scale question item	M	SD
1	This activity improved my memory capacity.	3.88	0.84
	This activity helped me judge which words could be useful to analyse and discuss my topic.	3.92	1.03
	This activity helped me understand how to ethically use AI to my own benefit.	4.15	0.77
2	This activity improved my reading skills.	3.88	0.99
	This activity helped me find relevant sources.	4.12	1.17
	This activity helped me develop skimming and scanning techniques.	4.12	0.86
3	This activity improved my writing skills.	4.00	0.68
	This activity helped me better integrate sources into my text.	4.21	0.58
	This activity helped me better understand what plagiarism means.	3.86	1.10
4	This activity improved my critical thinking.	4.10	0.45
	This activity helped me develop synthesis writing skills.	4.00	0.8
	This activity helped me reflect on the structure of my paragraphs.	4.15	0.75

Activity	Likert scale question item	M	SD
5	This activity improved my evaluative skills.	4.29	0.49
	This activity helped me better reflect on the role of peer-reviewing.	4.00	1.00
	This activity helped me increase my confidence in giving feedback and suggestions.	4.43	0.54
6	This activity improved my speaking skills.	3.78	0.83
	This activity helped me better reflect on the role of academic integrity.	4.22	0.44
	This activity helped me increase my confidence in creating PowerPoint slides.	4.22	0.67

Table 4: Mean and standard deviation values for the six AI-enhanced activities.

The results revealed that Activity 1 was particularly useful in starting a conversation on the ethical use of ChatGPT to improve students' academic performance (M=4.15). The conversation happening in the classroom between teachers and students appeared to be pivotal for students to judge the use of terms and expressions to be used in future activities (M=3.92) to understand the content of readings on the socio-cultural topic they chose to analyse (see Table 1). Students created a list of ten words accompanied by clear definitions while choosing the most relevant words in an attempt to build their own pool of resources to be used in the future (cf. Bloom et al., 1956). They swapped their list with other groups and assessed the clarity of the definitions generated with the help of ChatGPT. Despite obtaining a lower mean compared to the other two items for this activity, students agreed and often strongly agreed that this activity 'improved [their] memory capacity' (M=3.88). The assessment of the clarity of definitions was considered a way to memorise words.

Activity 2 was considered marginally more motivating than Activity 1 based on the slightly higher mean values. However, it soon became evident during the activity that most students needed help finding journal articles on the university library website or Google Scholar. In other words, they needed more scaffolds other than a library search skills session run by the university librarians. The reflection on the quality of the sources listed by ChatGPT, including evaluating the journal impact

factor using the SCIMago journal ranking website and the teachers' research experience in the field, strongly 'helped [students] find relevant sources' (*M*=4.12). Students managed to identify low-quality articles published in non-peer-reviewed academic journals or even non-existent articles invented by ChatGPT. The success of this activity was also due to the practical suggestions given by the teachers when students requested more attention and guidance, as also highlighted by van den Berghe et al.'s (2019) participants when using Chatbots. In a very limited time, students had to read the abstract, introduction and conclusion of the articles published in reputable peer-reviewed academic journals. To do so, they had been scaffolded with the explicit teaching of skimming and scanning techniques. Such an activity conducted under time pressure was found to be helpful in developing these techniques (*M*=4.12) and, less so, in improving reading skills altogether (*M*=3.88). Some groups managed to conclude this activity with two relevant peer-reviewed academic journals, while other groups found three as initially planned.

Activity 3 was dedicated to the development of writing skills, drawing on past studies on collaborative writing (e.g. Jia et al., 2022; Kessler et al., 2012; Storch, 2002, 2019). Students wrote a list of key points elicited from the two or three articles they selected. They asked ChatGPT to produce a synthesis based on the guidelines on how to write a synthesis covered in previous seminars given the particular role of good scaffolding practices in collaborative writing (Storch, 2002). Students started to assess the synthesis generated by ChatGPT and paraphrased it, applying the knowledge acquired in the first half of the course. Paraphrasing and rewording the text produced by ChatGPT appeared to 'help [students] better understand what plagiarism means' (*M*=3.86) in light of the university's policies pertaining to the use of ChatGPT in academic writing – 'Student Academic Integrity Policy' and 'Assessment and Results Policy'. Rewording and paraphrasing the GenAI-generated synthesis was considered very helpful in improving writing skills (*M*=3.88), although to a lesser extent compared to the skill sets developed when reflecting on effective and appropriate ways of integrating sources into an academic text (*M*=4.21). Students identified the limitations of over relying on GenAI and the 'risk' of integrating sources of low scientific value if not adequately assessed.

As outlined previously, Activity 4 represented a valuable opportunity for students to analyse the ChatGPT-generated synthesis and their own

paraphrased and remodelled synthesis version. Students were given time to continue Activity 3 if their group needed to elaborate further on their own synthesis. Once all groups finished rewriting their own synthesis, they were asked to apply their critical thinking to analyse the language they used to: 1) express ideas cohesively and logically, 2) write clear topic sentences, 3) connect paragraphs, and 4) introduce and conclude their final synthesis version. While reflecting on their writing, they explored the different strategies they used to avoid plagiarism and not breach academic integrity. All groups utilised a Padlet™ space where they uploaded three synthesis versions per group: ChatGPT-generated, their own and the final revised version. Data show that such a deep and structured reflection on the writing process 'strongly' and 'very strongly' helped the large majority of students 'improve [their] critical thinking' (M=4.1) and 'develop synthesis writing skills' (M=4).

Some students reflected on the 'directness' of the sentences identified in ChatGPT-generated texts and analysed them with the aim of understanding if their thoughts were correctly expressed, including all nuances they intended to present. Students questioned the analysis of the core themes elicited from the readings and the way they were incorporated into their synthesis. The emphasis on the internal cohesion of body paragraphs of a synthesis but also of a research essay in general was found to be very useful to 'reflect on the structure of [their] paragraphs' (M=4.15). The success of this activity was also related to the initial goals students had set to improve their academic performance in an English-speaking country. In particular, data confirm the motivational force of goals students aim to achieve in L2 courses (see D'Orazzi, 2024a).

As part of Activity 5, each group was invited to peer review the work produced by their fellow students. Peer reviewing techniques were introduced during the course to prepare students for providing constructive and thoughtful feedback to the other groups. A fourth column was added to the Padlet™ used for Activities 3 and 4 to facilitate students to answer several questions formulated to structure their peer review:

1. How has this synthesis been structured?
2. Do paragraph topic sentences indicate the main topic analysed in the paragraph?
3. Is the introduction presenting the core topic of this synthesis?

4. Is the conclusion summarising the main themes covered in the synthesis?

5. Which academic English features have been used?

Students appeared to be very motivated and able to identify different changes across the three synthesis versions. The guide received from the five aforementioned questions was pivotal for student participants to evaluate the different writing strategies underpinning the delivery of the final revised synthesis. The scaffolding provided by the teachers guaranteed the 'increase [of students'] confidence in giving feedback and suggestions' (*M*=4.43), including students' more extensive understanding of 'the role of peer reviewing' (*M*=4) not exclusively for the EAP course but also for the academic career more broadly. The discussions entertained within the different groups supported students' enhancement of 'evaluative skills' (*M*=4.29) of the quality of the synthesis produced by other groups in the classroom. Concurring with Wu et al.'s (2011) research findings, most of the students took on board the comments and suggestions provided by their peers.

For Activity 6, students were required to create a PowerPoint presentation to be used for their oral presentation as part of their final assessment. The pre-activity preparation was particularly valuable and helpful because students learnt how to prepare an engaging, stimulating and well-articulated presentation immediately prior to Activity 6, as evidenced also by Kessler et al. (2012). When feeding ChatGPT with relevant background information, they reflected on the arguments they intended to propose and the supporting information to be included. ChatGPT-generated slide content, which was soon paraphrased by students, considering what they had learnt about plagiarism during the first nine weeks of the semester. Very encouraging results demonstrate that Activity 6 made it easier for students to 'reflect on the role of academic integrity' (*M*=4.22). The analysis of multiple slide components revealed a strong increase in students' confidence in including nuanced and meaningful PowerPoint presentations (*M*=4.22). The following slide components were analysed:

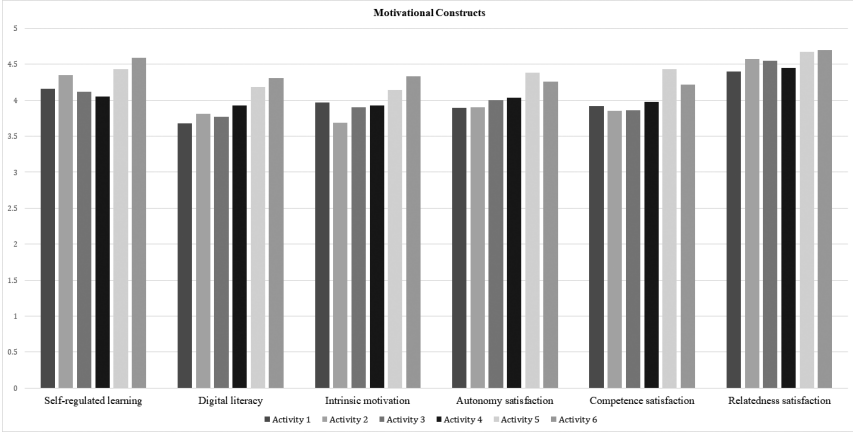
1. The use of academic language.

2. Plagiarism and academic integrity norms.

3. The introduction of the aims of a presentation.
4. The clarity of the information presented.
5. The inclusion of key points and themes.
6. The general structure of the presentation, including the incorporation of visual aids.

Student participants were also asked to respond to a third Likert scale question item related to their speaking skills improvement for this activity. The relatively lower mean value for this item (M=3.78) compared to all other question items tied explicitly to the six activities suggests that students' responses might have been misled by the fact that they did not practice any oral skills during this activity as it had been planned at the beginning of the semester. As noted before, the lack of time did not allow the teachers to proceed with this last component of Activity 6, which was expected to trigger very positive emotions, as in Gleason and Suvorov (2012).

The six online questionnaires also included 17 Likert scale question items to investigate how AI-enhanced activities helped learners sustain their initial motivation to achieve their goals (Table 3), given their weight in L2 learning motivation research (cf. D'Orazzi [2020a; 2024b] on the importance of classroom activities). In particular, students reflected on the significance of the English language for their intellectual growth and academic career. Table 5 depicts the changes recorded over time across the six different constructs utilised to measure students' motivation when using ChatGPT, drawing on Chiu et al.'s (2023) research methods. Relatedness satisfaction recorded the highest means for all six activities, confirming Ryan and Deci's (2020) argument that relatedness to and ownership of a research topic strongly motivates L2 learners. Students worked in small groups and felt a strong sense of belonging to their small group and the whole class cohort.



Motivational constructs	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6
Self-regulated learning	4.16	4.35	4.12	4.05	4.43	4.59
Digital literacy	3.68	3.81	3.77	3.93	4.18	4.31
Intrinsic motivation	3.97	3.69	3.90	3.93	4.14	4.33
Autonomy satisfaction	3.89	3.90	4 .00	4.03	4.38	4.26
Competence satisfaction	3.92	3.85	3.86	3.98	4.43	4.22
Relatedness satisfaction	4.40	4.57	4.55	4.45	4.67	4.70

Table 5: Mean values (M) for the six motivational constructs across the six AI-enhanced activities.

The increase in 'relatedness satisfaction' coincided with Activities 2 and 3 (M=4.57 and 4.55, respectively), during which students used ChatGPT to facilitate their research of reputable peer-reviewed academic sources and the production of a synthesis of the previously selected sources. High mean values were also recorded for Activity 5 (M=4.67) and Activity 6 (M=4.7) when students worked very tightly together with their peers to submit meaningful comments on the other groups' synthesis and to design a clear and coherent presentation. The sense of autonomy stemming from this activity might also have influenced the high levels of motivation emerging from students' participation (see also Li, Bonk & Zhou, 2023 on developing self-management skills).

One of the core aspects of integrating ChatGPT into this first-year EAP course was the promotion of 'self-regulating learning', given its very motivating impact on students' learning experiences (Li & Bonk, 2023; Li, Bonk & Zhou, 2023). Statistical analysis of students' responses sheds light on the different reactions students manifested depending on the specificity of each of the six activities. Despite the very high means for Activities 5 and 6 (*M*=4.43 and 4.59, respectively), for which low participation rates were recorded, the overall results appear particularly remarkable for the rest of the activities. Indeed, obtained data clearly demonstrate that students largely benefitted from the assessment of (a) vocabulary and terms and (b) sources (*M*=4.16 and 4.35 respectively for Activities 1 and 2), which helps promote their future self-regulated learning without the support from group members and the teachers in their subsequent studies at the university (see also Li et al., 2024). To a lesser extent, the group work to (c) generate the synthesis and (d) paraphrase it also influenced self-regulated learning (*M*=4.12 and 4.05, respectively, for Activities 3 and 4).

Statistical analysis provides evidence for increased 'autonomy satisfaction' over time (Ryan & Deci, 2020). Higher means for the last four activities (Activities 3-6) signal a growth in students' abilities to use ChatGPT for their own benefit. Creating a synthesis (*M*=4.00), analysing and improving it (*M*=4.03), providing constructive feedback to the synthesis written by another cohort (*M*=4.38), and creating a presentation (*M*=4.26) were processes students autonomously carried out with minimal intervention from the teachers. Lower levels of autonomy satisfaction for the first two activities (*M*=3.89 and 3.9, respectively) underline how some students needed to familiarise themselves with ChatGPT and academic integrity norms established by their higher education institution.

'Comptence satisfaction' stemmed from the increased students' competence in applying the knowledge acquired during the course to deliver high-quality academic English. This finding concurs with Li and Bonk's (2023) study, where learners expressed high satisfaction levels in autonomously using Duolingo™. Activities appeared to equip students with the competencies to write an academically rigorous synthesis (*M*=3.86), and improving it drawing on the knowledge gained during the semester (*M*=3.98). These also contributed to enhancing students' capabilities in distinguishing which words and terms are more useful than others (*M*=3.92) and reading the literature pertaining to a topic (*M*=3.85).

Furthermore, competence satisfaction appears to be related to the ability to discriminate between valuable and less valuable information to be included in PowerPoint slides (*M*=4.22) and provide meaningful feedback to classmates, which was found to be one of the most satisfying activities (*M*=4.43).

As for all six motivational constructs under investigation, Activities 5 and 6 boosted very strong students' 'intrinsic motivation' (*M*=4.14 and 4.33 respectively). It is possible that students might have been more interested in these last activities than in the previous ones due to the longer exposure period to ChatGPT during the semester. This might have increased their confidence in using the skills developed in the first half of the semester, firstly to provide peer feedback to their fellow students and secondly to include the most relevant and interesting findings of their research in the final PowerPoint presentation slides. Relatively high levels of intrinsic motivation also characterised students' approach to the first and fourth activities. Analysing relevant vocabulary (a) to being able to delve into students' chosen topic and (b) critically evaluate their own synthesis generally led to fun, enjoyment and interest (*M*=3.97 and 3.93 respectively). Students' goals of studying EAP 'for improving [their] overall academic performance' triggered relatively high levels of interest and enjoyment when completing these two activities (see D'Orazzi [2020b] for the analysis of learners' enjoyment in communicating in an L2). Nevertheless, paraphrasing and improving the ChatGPT-generated synthesis were found not to be the most stimulating tasks students were invited to accomplish in the classroom, lower levels of intrinsic motivation were recorded for Activities 2 and 3 (*M*=3.69 and 3.9 respectively).

Likewise, lower mean values were also recorded for the motivational category 'digital literacy'. Apart from Activities 5 and 6 (*M*=4.18 and 4.31), whose questionnaires might have been completed by the most motivated students across all motivational categories, students appeared not to be very confident with their digital literacy and capabilities when completing the other four activities. Some students appeared to lack the requisite digital literacy and skills to properly and effectively use ChatGPT at the beginning of the semester. Indeed, the lowest mean value was recorded for Activity 1 when exploring students' confidence using ChatGPT (*M*=3.68). The ability to use ChatGPT also hinged on the success of Activities 2 and 3 when some students struggled to find

reputable sources and generate a logical and clear synthesis (*M*=3.81 and 3.77). Better results are linked to the digital literacy necessary to assess their own final synthesis version (*M*=3.93).

In summary, the dynamics experienced in the classroom suggest that only the most engaged students fully took advantage of the opportunities afforded by using ChatGPT during the AI-enhanced learning activities. As a result, the benefits obtained by the meta-analyses of their academic English language use do not appear equal for all student participants. Nevertheless, our pilot study did find, though not at high levels, some moderate improvements in digital literacy over time. This finding also aligns with Bodnar et al.'s (2016) participants' experiences, whose motivation to learn an L2 increased alongside improving their digital literacy and capabilities.

Section 4: Moving forward

Our study's longitudinal nature allowed us to portray differences across the six AI-enhanced learning activities over time. The EAL students' real-time responses (immediately after each activity) to the questionnaires pictured the complexity of student motivation and class dynamics, which changed across the nine weeks of research. Non-AI-enhanced activities were proposed during the tutorials before and after the AI-enhanced activities to (a) investigate the socio-cultural topics introduced in the lecture more in detail, (b) improve students' writing and speaking skills, and (c) reflect on the transferability of what they learned in the semester. These included group oral presentations marked and counted for students' final scores. Future research might investigate the role of ChatGPT in helping students prepare oral presentations apart from the design of PowerPoint slides as done for Activity 6.

As mentioned above, relatively lower levels of agreement regarding the improvement of digital literacy during the semester in this pilot study strongly suggest that students needed more comprehensive training on how to use basic digital literacy before using ChatGPT in the classroom (see the Digital Research Council, 2024). Moving forward, we would strongly suggest providing more opportunities for students to familiarise themselves with the functions afforded by ChatGPT to facilitate and enhance their learning. This might include online workshops where students can be instructed on how to effectively use ChatGPT before the beginning of their

course. As a result, the benefits of prior knowledge on a specific topic or tool might also decrease students' anxiety triggered by classroom activities, as found by D'Orazzi (2020a; 2024b). Given the very young age of most student participants (<25 years), we were influenced by our own unconscious biases and took for granted that students could utilise ChatGPT more or less effortlessly. Corroborating Chiu et al.'s (2023) study, this was not the case for some groups with less developed digital literacy, in which students spent a considerable amount of time figuring out how to use ChatGPT in the most time-effective way (see also the Digital Research Council, 2024; Spector & Park, 2017).

Similarly, we discovered that the one-hour tutorial duration also presented a problem concerning Activities 2 (comprehension level) and 3 (application level). We did not expect this time factor to become a problem in our activity implementation in the classroom when we designed these two learning activities despite previous research arguing that fast pace demotivates L2 learners who need more time to complete learning activities (D'Orazzi, 2020a). This is a lesson learnt from this pilot study. Thus, implementing these activities in two-hour tutorials rather than one-hour tutorials could benefit students' learning experience and increase their activity engagement and collaboration with peers in the future, including their overall performance (Li & Bonk, 2023) and enjoyment (D'Orazzi, 2020b).

Moreover, we also observed that some groups with less developed digital literacy, in particular, needed more time to select their sources and assess their quality (see Chiu et al., 2023). It appeared that most of the students had never searched academic peer-reviewed articles before starting this EAP course. Likewise, our experience while administering these activities confirmed that the scaffolding activities introduced in Table 2 were an excellent starting point, which needed more attention in follow-up practice sessions such as the one provided with Activity 2. A similar challenge was experienced for Activity 3. Feeding ChatGPT with the key arguments emerging from the analysis of the two or three selected sources was a task that required intensive work. Building upon the findings from this pilot study, we will allocate more time for this specific activity to ensure that students elicit core information from the selected journal articles and feed ChatGPT with the relevant information to generate a synthesis that captures similarities and contrasting ideas across the sources under investigation.

Conclusion

In this study, our goal was to understand the role of ChatGPT in an L2 classroom and conceptualise the motivational dynamics triggered by the use of ChatGPT to "*enable learners and teachers to optimally profit from the affordances that technology provides*" (Henry & Lamb, 2019, p. 614). The findings from our data analyses strongly support the argument that introducing technology into the formal learning environment inspired students with a wealth of ideas and reflections as also discovered in previous similar studies (D'Orazzi, 2024b; Li et al., 2024; Storch, 2019). High mean values collected immediately after the conclusion of the six activities clearly signal students' their willingness to acquire and develop relevant skills to adequately and effectively make use of AI tools (cf. the Digital Research Council, 2024).

The extent to which students' satisfaction boosted their interest in using ChatGPT is a testament to the validity and significance of research projects like this pilot study. The enthusiasm emerging from the 72.3% participation rate for the first activity questionnaire motivates future research to apply the same six activities to language courses aiming at scaffolding students with the necessary tools to navigate their academic lives. The emergence of critical thinking and deeper learning when assessing ChatGPT-generated work and students' work sheds light on university students' genuine 'thirst' for authentic learning experiences — driven by their own curiosity — to practice their critical thinking and perform a meta-reflection on their learning strategies and academic performance (cf. Enomoto et al., 2022).

The skills students acquire during this EAP course are intended to enhance their academic performance across different disciplines and faculties. All six activities were not designed with a specific faculty's student population in mind. They were considered valuable for students specialised in any field of knowledge. Research evidence supports our argument that knowing how to use AI ethically and effectively can enhance students' learning and improve their results (cf. Li & Bonk, 2023; Li, Bonk & Zhou, 2023). The profound reflection on the limitations of ChatGPT-generated 1) vocabulary lists, 2) reference lists, 3) syntheses, and 4) PowerPoint slides represented a first step for many students to develop digital literacy and capabilities. In this pilot study,

being digitally literate proved to be Achille's heel for most student participants, as lamented by the large majority of the participants of the Digital Education Council (2024) Global AI Student Survey. Whilst a moderate increase in digital literacy and confidence was seen over time, our future EAP course curriculum might also specifically target developing the requisite and transferable digital literacy for EAL students to use technology effectively for their own benefit.

With the advent of GenAI in higher education, we identified the necessity to renew our EAP course curriculum with two essential goals: 1) developing EAL students' AI literacy to ensure the appropriate use of AI-powered tools while maintaining academic integrity and 2) fostering deeper learning to develop their academic English skills through higher-order thinking and meta-cognitive strategies. This chapter provides valuable insights into the significant impact AI-enhanced learning activities can have on EAL students' motivation. It offers practical examples of how these activities can be designed and implemented effectively to help students complete tasks and produce meaningful output (Enomoto et al., 2023; Kember et al., 2008). Furthermore, it outlines recommendations and instructional steps for embedding AI-enhanced learning activities within a curriculum, guided by Bloom's Taxonomy (Bloom et al., 1956). The findings presented affirm that integrating GenAI in a way that cultivates motivation can significantly promote learner autonomy by enriching the overall language learning experience.

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