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Empowering Learners: Exploring Teaching Strategies, AI Integration, and Motivation Tools for Fostering Autonomous Learning in Higher Education

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Abstract

Being an independent learner is essential in higher education, particularly with the advancement of artificial intelligence (AI) tools and learning-facilitating digital platforms. However, it appears that curriculum designs and teaching methods fall well short of encouraging students to learn on their own by applying their critical thinking and problem-solving abilities. The relationship between autonomous learning and academic achievement, teaching methods that encourage autonomy, and the impact of AI tools and digital platforms on inspiring students to be self-directed learners are covered in this research paper. This research paper utilized two surveys that have a mixed-methods approach to analyze high level students and educators perspectives towards the role of education in motivating learners to be autonomous learners. The results affirmed that teachers and students have challenges in implanting autonomous learning that could be addressed by developing critical thinking motivation and problem solving strategies , and AI tools have a great impact in developing autonomy for high level students . Thus it is recommended to edit curriculum practices and teaching strategies benefiting from the new AI tools with attention to equity and ethical use of these tools.

***Keywords*: Autonomous Learning, Motivation, AI Integration.**

1. Introduction

Autonomous learning, known as self-directed learning, has gained prominence as a crucial issue in higher education, where the learner is more responsible for self-learning. This aspect aligns with the constructivist paradigm, which advocates for greater learner involvement and knowledge construction based on the learner's experiences. (Knowles, 1975). However, with the development of technology, traditional teaching has become less effective. Thus, there was a recognized need to provide options for students whose cognitive, emotional, and social needs weren't being met, to foster a school climate of acceptance and nurturance in which students actively helped shape the school's direction; initial informal discussions evolved into more organized conversations that laid the groundwork for the Autonomous Learner Model, and the gifted and talented program centers on three essential levels of learner-differentiated curriculum: learner-differentiated curriculum, teacher-differentiated curriculum, and prescribed curriculum. (Betts & Kercher, 2009)

Although developing self-efficacy among students has gained considerable attention in recent times on a global level, inconsistencies persist, as many colleges and universities have yet to effectively revise their curricula, approaches, and even technologies that facilitate learner autonomy. It remains unclear which approach would be most effective for students to learn independently, including the most appropriate institutional strategic and pedagogical measures. This makes the learners become more eager to be equipped with such a learning orientation.

On one hand, the necessity of promoting self-efficacy among students has gained relevance in the past, but understanding the roles that institutions, teachers, and technology play in promoting autonomy is still an under-researched area. Literature suggests that it is essential for educational settings to apply a new strategy that centres on the students and gives them sufficient resources to learn on their own (Benson, 2011). Unfortunately, there is a lack of research evidence about learning practices that help students gain autonomy (Little, 1995). Saborío and

Rojas (2024I) insisted that there is a need for autonomous learning as independence is becoming increasingly significant for developing and empowering them to participate actively to attain leadership responsibilities, and nurturing a feeling of ownership of education .

Moreover, while AI-powered personalized learning tools are increasingly utilised, their impact on learner autonomy and critical thinking development remains underexplored (Holmes et al., 2019). Addressing these gaps is crucial for designing educational systems that prepare students for independent and lifelong learning.In addition, although the use of digital and AI applications has become more frequent to improve education, the relationship between such technology and autonomy in learning as well as other academic results, is still inadequately investigated.(Nopas,2025)The development of AI has prompted educators from diverse backgrounds to engage in reflection, explore various perspectives, assess the impact on teaching and learning, and share both concerns and aspirations(Saborío & Rojas.,2024). Similarly, Wang and Li (2024) emphasized that digital efficacy strongly affects the willingness for autonomous learning. Therefore, higher education institutions should promote AI technology, enhance students' expectation-confirmation levels, and emphasize positive emotional experiences during AI use

For this reason, this research paper aims to determine the embedded motivating factors within the institutional practices and teaching strategies that engender self-directed learning in higher education. Additionally, it explores students' motivation for self-directed learning, especially in different cultural and socio-economic settings. It further clarifies the impact and effectiveness of AI-based individualization tools towards enhancing autonomy, critical thinking, and problem-solving abilities.

Based on the above, this research paper is going to investigate the following research questions:

1. What is the relation between autonomous learning and academic performance in higher education concerning developing learners' critical thinking and problem-solving skills?

2. What strategies and teaching practices can educators use to foster autonomous learning and motivate students to adopt autonomous learning?

3. How do AI-personalized tools and platforms support autonomous learners, and what is their impact on learners' autonomy?

2. Theoretical Foundation of Autonomous Learning

Autonomy has long been recognized as a central feature of effective adult learning and is increasingly important in higher education. Theories of adult learning and motivation emphasize learners' self-direction, the relevance of learning to immediate needs, and intrinsic motivation. In contemporary educational settings, technological tools such as AI and conversational agents add new dimensions—both supporting and constraining autonomy. Autonomy—understood as self-direction, intrinsic motivation, and the freedom to shape one's learning—is a foundational principle in adult learning theory and a key predictor of academic success and lifelong learning; while educational technologies can enhance autonomy through personalization and scaffolding, they also pose risks that educators must manage to preserve genuine learner independence.

Recently, Knowles's theory of adult learning positions autonomy at the center of how adults learn best. Malcolm Knowles (1975, 1984) advanced the concept of andragogy, arguing that adults are self-directed learners who draw on life experience and prefer learning that addresses immediate, practical needs. According to Knowles, adult motivation often stems from perceiving learning as directly relevant to work or personal goals. Adults favor problem-centred learning and are driven more by internal rewards—such as personal growth and satisfaction—than by external incentives like grades. These characteristics make autonomy a critical condition for effective adult learning. Moreover, Self-Determination Theory complements Knowles by explaining the psychological mechanisms behind autonomous motivation. Deci and Ryan's Self-Determination Theory (1985) emphasized intrinsic motivation and identifies autonomy, competence, and relatedness as basic psychological needs that sustain motivated behaviour. SDT rejects overly simplistic links between perceived independence and performance, instead arguing that when learners feel autonomous and competent—and when social relatedness is

present—they are more likely to engage deeply, persist, and perform well. This theoretical perspective clarifies why adult learners who experience autonomy are more likely to pursue learning for internal motives and translate that engagement into meaningful outcomes.

Hence, autonomy is enacted through goal setting, self-assessment, and adaptive strategies—core elements of the problem-solving cycle. Knowles (1975) described self-directed learning as including goal formulation, monitoring progress, and modifying approaches—activities that mirror the problem-solving cycle. When students set objectives, evaluate their progress, and adapt strategies, they practice metacognitive regulation that reinforces both competence and motivation. Research shows that students who actively manage their learning processes develop deeper understanding and more durable skills, which supports long-term professional competence (Deci & Ryan, 1985).

Similarly, in the modern age, higher education autonomy supports the development of critical thinking, problem-solving, and transferable skills essential for professional life. Higher education frequently requires students to work independently on complex problems, a context that fosters autonomous learning. Independent learning cultivates critical thinking and problem-solving by encouraging learners to reflect on tasks, apply knowledge across contexts, and regulate their study processes. Zimmerman (2002) links self-regulation to greater cognitive engagement—an essential precursor to critical thought—while Benson (2011) notes that engaged, self-directed learners demonstrate improved abilities to assess, synthesize, and evaluate material. These cognitive capacities translate into stronger academic performance and better preparation for dynamic workplace challenges.

Nevertheless, emerging evidence on educational technologies demonstrates both opportunities and threats to learner autonomy. Recent empirical studies illustrate how technologies intersect with SDT and autonomy. Annamalai et al. (2025) applied SDT to initial student use of ChatGPT and found that early interaction predicted perceived autonomy, competence, and relatedness; autonomy and relatedness predicted competence and motivation for continued use. Their validated SDT model accounted for a large proportion of variance in motivation for ongoing ChatGPT engagement, suggesting that technology can strongly support autonomous engagement when it fosters these psychological needs. Conversely, Nopas (2025) found that AI learning platforms can both support autonomy through personalization and limit exploration via algorithmic constraints; they may also structure social interaction in ways that feel impersonal, and digital inequities can disadvantage learners in rural contexts. These mixed findings indicate that while technology can boter autonomy, design choices and access issues critically shape outcomes.

To sum up, autonomy is a foundational concept in adult learning theory and a practical necessity for success in higher education. Knowles's and Deci & Ryan's theoretical frameworks together explain why self-direction, intrinsic motivation, and the satisfaction of psychological needs promote deep learning, critical thinking, and adaptive problem-solving. Contemporary digital tools have the potential to enhance autonomy by personalizing learning and supporting competence and relatedness, but they also introduce risks—algorithmic limitation, impersonal interactions, and equity gaps—that require careful design and policy attention. Educators and institutions should therefore cultivate environments that intentionally support autonomy, competence, and relatedness while ensuring ethical, equitable implementation of learning technologies.

2.1 Strategies to Foster Autonomous Learning

Institutions play a pivotal role in shaping learners' capacity for self-directed learning. By creating environments, curricula, and supports that encourage independence, institutions can help students develop the skills, motivation, and habits necessary to learn autonomously. . Hence, institutions can effectively promote self-directed learning by designing supportive learning environments, adopting learner-centred teaching methods, cultivating metacognitive skills, and explicitly teaching self-regulation strategies; together these approaches build students' competence, motivation, and capacity to direct their own learning.

First, institutions create supportive, learner-centred environments that enable choice and skill development. Institutions can promote autonomy by implementing learner-centred curricula that allow students to select subjects, projects, and assignments aligned with their interests and goals (Benson, 2011). Providing access to digital resources, workshops on time management, and systematic self-assessment methods equips learners with

the practical tools required for independent study (Zimmerman, 2002). In such settings, students are given ownership over what and how they learn, which increases relevance and engagement.

Second, they foster social supports and individualized guidance to reinforce independent learning. Establishing encouraging learning environments—through collaborative initiatives, peer-mentorship programs, and targeted instructor feedback—promotes independence while preserving social support networks. Peer mentorship and group projects let students practice autonomy in a social context, whereas individualized feedback helps learners evaluate their progress and adjust strategies (Knowles, 1975; Paethrangsi et al., 2024). These supports both scaffold self-directed behaviour and reduce the anxiety that can accompany independent tasks.

Third, they can use constructivist teaching strategies that position educators as facilitators rather than sole knowledge transmitters .Constructivist approaches—such as inquiry-based learning, problem-based learning, and flipped classrooms—engage students actively and develop critical thinking and problem-solving abilities (Little, 1995; Benson, 2011). Teachers act as facilitators who design authentic tasks, pose guiding questions, and provide formative, learner-centred feedback. Encouraging peer feedback, self-assessment, reflective diaries, and assignment prompts that require initiative nurtures the habits of independence and reflective practice (Zimmerman, 2002).

Fourth, they develop metacognitive skills so students can plan, monitor, and evaluate their own learning. Institutions should teach metacognitive techniques—such as self-questioning, mind mapping, and maintaining learning journals—that help students become aware of their planning, monitoring, and evaluation processes (Zimmerman, 2002; Paethrangsi et al., 2024). When learners recognize their strengths and weaknesses and link learning activities to career or personal goals, intrinsic motivation increases. Promoting a growth mindset encourages students to view challenges as opportunities for development, reinforcing persistence and adaptive learning strategies (Dweck, 2006).Teach explicit self-regulation strategies to empower learners to manage time, stress, and tasks. Self-regulation instruction—covering time management, organization, goal-setting, and stress-management techniques—enables students to take control of their learning and overcome obstacles independently (Pintrich & Schunk, 2002; Paethrangsi et al., 2024). Institutions can offer workshops, curricular modules, and scaffolded assignments that require planning and reflection. Clear expectations, availability of resources, and meaningful choices further strengthen students' willingness to adopt autonomous learning practices (Little, 1995; Knowles, 1975).

Overall, to cultivate self-directed learners, institutions must combine learner-centred curricula, supportive social structures, constructivist teaching methods, metacognitive training, and explicit self-regulation instruction. These elements work together to enhance students' competence, intrinsic motivation, and ability to direct their own learning. By intentionally designing policies, programs, and classroom practices that respect student choice and build strategic learning skills, institutions prepare learners for academic success and lifelong adaptability.

2.2 .Digital Tools and AI Impact on learners' autonomy

Digital tools have transformed education by expanding access to information, resources, and learning opportunities. From Learning Management Systems (LMSs) to AI-driven platforms and immersive technologies, these tools can support learners in taking charge of their own learning. However, their potential depends on purposeful integration, ethical design, and equitable access. Hence, digital tools — when thoughtfully integrated with learner-centred pedagogy and equitable practices — can substantially enhance autonomous learning by offering personalized pathways, timely feedback, flexible resources, and collaborative spaces; yet their effectiveness depends on ethical design, attention to accessibility, and ongoing pedagogical adaptation.

Learning Management Systems and digital resources provide flexible, self-paced environments that encourage independence. Learning Management Systems such as Moodle and Canvas give students continuous access to course materials, progress tracking, and channels for interaction with peers and instructors (Kaufman, 2020). LMSs enable self-paced study, allow learners to revisit content as needed, and provide built-in tools for assessment and reflection. Complementary digital resources — interactive simulations, e-books, and online discussion forums — develop critical thinking and problem-solving skills that underpin autonomy (Benson, 2011). By making materials and progress visible, these platforms help learners plan, monitor, and evaluate their own learning.

AI-powered personalization tailors learning pathways and feedback to individual needs, strengthening learner agency.AI-driven adaptive systems use learning analytics to identify strengths and gaps, recommend resources, and adjust difficulty and pacing to match a learner's profile (Holmes et al., 2019; Brusilovsky, 2001). Such personalization can increase relevance, sustain engagement, and provide actionable feedback that empowers students to take responsibility for progress. When combined with Universal Design for Learning (UDL) principles, AI can support diverse learners by offering multiple means of representation, expression, and engagement; however, ethical use and design are essential to prevent bias and avoid widening existing digital divides (Saborío & Rojas, 2024).

Immersive and interactive technologies deepen understanding and motivation through experiential learning.Virtual reality, simulations, and game-based learning can increase learner satisfaction and provide richer, more situated experiences of subject matter (Checa, 2021). These tools promote active exploration and problem-solving in safe, repeatable contexts, enabling learners to practice complex skills and receive immediate feedback. Such experiential technologies support autonomous learning by encouraging learners to experiment, reflect, and iterate their approaches based on outcomes.

Digital communication and collaborative platforms cultivate communities of practice that support autonomy.Online forums, social media, and video conferencing tools connect learners with peers, mentors, and experts, fostering social interaction and shared knowledge construction consistent with sociocultural theories of learning (Vygotsky, 1978). Corpus-based tools and concordance programs, for example, have been shown to shift the teacher's role toward facilitation and to cultivate student independence in language learning by enabling self-access and research-based activities (Charles, 2022). Collaborative digital spaces allow learners to co-regulate, give and receive feedback, and develop the meta-skills required for sustained independent inquiry.

Effective implementation requires ethical design, teacher facilitation, and attention to equity. Digital tools alone do not guarantee autonomy; their benefit depends on how educators integrate them into pedagogies that promote metacognition, choice, and self-regulation. Teachers must act as facilitators who scaffold skill development, model reflective practices, and design tasks that require initiative and critical thinking. Equally important are considerations of digital equity: access, affordability, and inclusive design determine whether tools empower all learners or exacerbate disparities. Purposeful policies and professional development help ensure technologies augment rather than replace the human dimensions of teaching and learning.

To sum up, digital technologies offer powerful affordances for autonomous learning: flexible LMSs, AI personalization, immersive simulations, and collaborative platforms can foster self-regulation, critical thinking, and learner agency. Rooted in principles from Knowles's andragogy and Self-Determination Theory, these tools can amplify the motivation and capacity of learners when aligned with learner-centred pedagogy, ethical design, and equitable access. To realize their promise, institutions and educators must integrate technology thoughtfully, support metacognitive and self-regulatory skill development, and prioritise inclusive practices so that technology becomes a means to empower every learner's autonomous journey.

3. Methodology

This research paper aims to investigate the teaching practices , strategies and the effects on AI tools on developing learners' autonomy. Thus, a descriptive mixed method research was conducted on high level students and teachers.

3.1 Sample

This research paper investigated the effect of empowering high school learners with autonomous strategies on secondary and university students and teachers.

Thus, the main sample of this research is high level learners and educators. It deeply examined the high-level students' experience in being motivated to learn independently using digital tools and AI-personalized tools. High-level students were chosen because they are more flexible and have more responsibility for being self-learners. (Koweles,1984;Zammam,2002) It used random sampling by distributing online survey on students at different Lebanese universities and schools. Because the population was a large population, and there was no significant

study that determined their exact number in 202. Thus, I determined the sample size as 100 participants. as illustrated by Kothari (2004).

Furthermore, this study focused on how much university educators use AI strategies that foster learners' autonomy. In this way, this research suggested a strategy to implement AI in teaching at the Lebanese context. For sampling technique, I depended on non-randomized strategy. I used a purposive sampling method that involves intentionally selecting individuals with specialized knowledge or expertise relevant to a research topic to gain in-depth insights, validate other findings, or identify key issues in a complex field. For sampling size, I chose 15 response from educators who teach at Lebanese universities and high schools. I asked also non-Lebanese teachers to respond to the survey to generalize the research results.

3.2 Research Design and Data collection

To address the research questions surrounding autonomous learning in higher education, a descriptive study was conducted. It depended on a mixed-methods approach that would provide a comprehensive understanding of institutional strategies, teaching practices, student motivations, and the role of AI-driven tools. This methodology combines both qualitative and quantitative methods to explore the multifaceted nature of autonomous learning. Therefore, we used the following surveys to collect data:

1. Educators' Survey

A semi-structured survey with educators and administrators will provide in-depth insights into the challenges and successes of fostering autonomous learning. The interviews with faculty could examine how constructivist teaching practices are integrated into curricula (Benson, 2011; Little, 1995). **Thus,** the researcher used sed to explore the institutional strategies and teaching practices that promote autonomy, as well as the factors influencing student motivation. It has six sections: demography analysis, teaching practices, curriculum design and autonomous learning, motivation tools and student engagement, use o AI and challenges in AI use.

Each section was analysed using mixed methods. For quantitative analysis, we used Likert-type questions that were analyzed using correlation. For qualitative analysis we depended on thematic analysis for the open questions.

2. Students' survey

Kothari (2004) describes the survey method as a technique of collecting information from a sizeable and representative sample of respondents about their characteristics, opinions, attitudes, or past and present behaviour, usually through questionnaires or interviews.

Therefore, a survey-based approach was employed for university and technical institution students. It gathers quantitative and qualitative data on the following topics: students' demographics, effectiveness of autonomous learning, motivation to engage learners, measuring students' autonomy, critical thinking skills, problem-solving skills, and challenges.

The survey uses a mixed-methods approach. Quantitative analysis includes Likert-scale items to measure students' self-reported autonomy, critical thinking, and problem-solving skills, as well as their perceptions of AI tools' effectiveness. It also utilised open-ended questions that evaluate students' attitudes, which will be analysed qualitatively.

To analyze the data, I depended on statistical descriptive analysis to determine the highest percentage of each scale. I also used thematic analysis for qualitative data.

4. Result Discussion

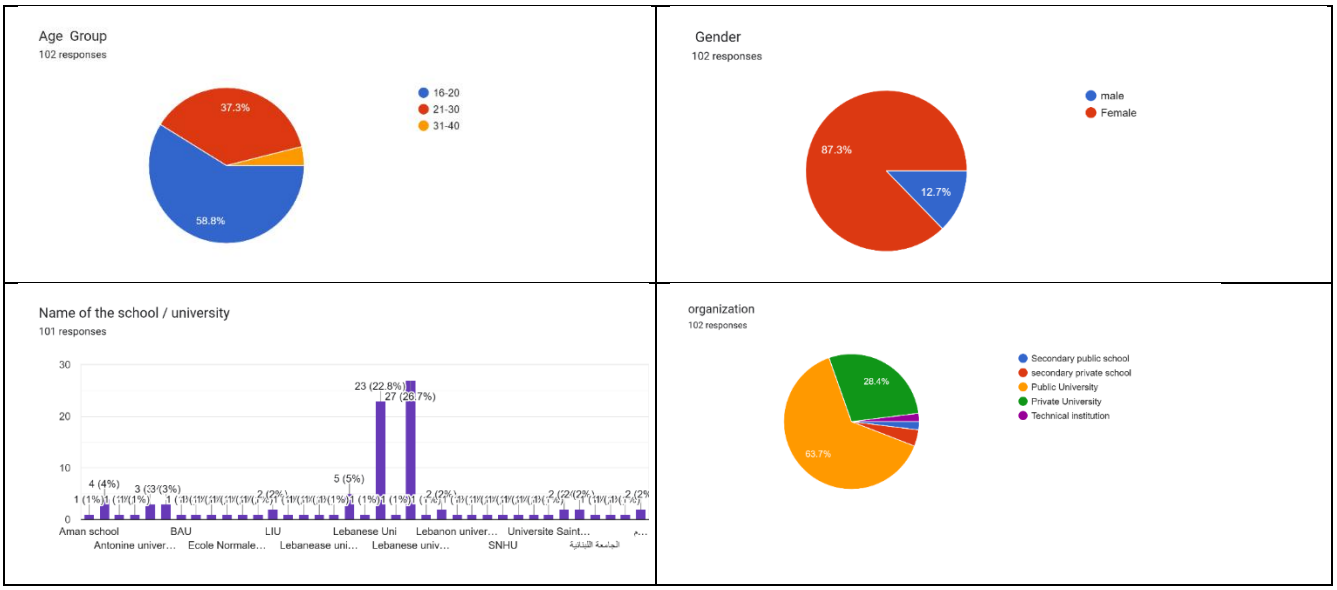
After conducting the two surveys ,the answers were collected and analyzed using descriptive statistics for qualitative analysis and thematic analysis for qualitative analysis

4.1 Students' Survey Analysis

Quantitative analysis

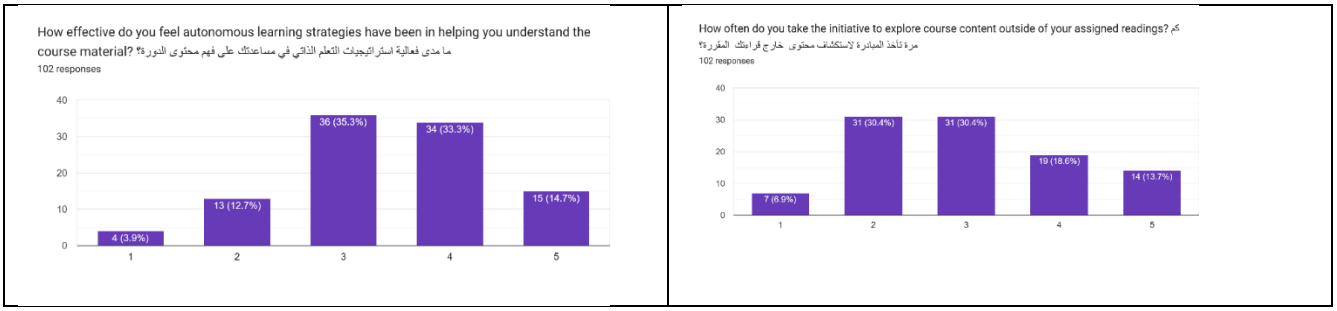
Students Demography

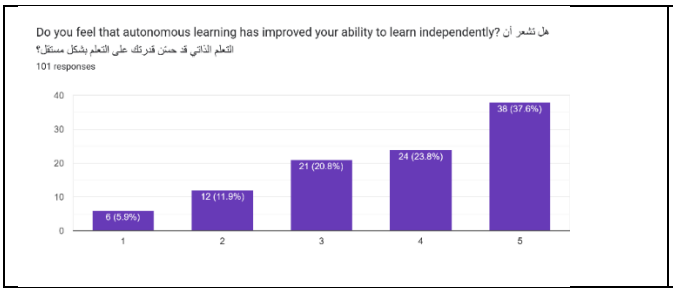
This survey was addressed to secondary and university students whose ages are from 16 to 40 . Thus, the students who shared from secondary level (59%) and university level (38%) and the other high studies. 87.3% of them are female which is one of the limitations of the study. 63% of them study at the Lebanese University and the others are equally distributed at secondary and private universities (LIU, AUL, Antonie..) The field of study responses reflect a diverse range of academic backgrounds.there is notable representation from English, Business Management, Marketing, and Human Resources. Other fields such as Biomedical Sciences, Engineering, IT, and Medicine highlight the presence of students pursuing careers in science, technology, and healthcare. Some responses also pointed to Educational Management and Social Sciences**.** The variety in disciplines suggests that the respondents bring different perspectives to learning, especially regarding autonomous learning and AI integration. Those in humanities and social sciences may emphasize critical thinking and analysis, while STEM and business students might focus on practical applications and technology-driven solutions.



Autonomous learning effectiveness

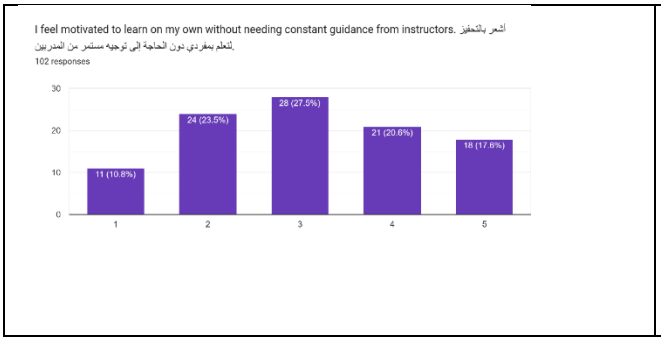
The quantitative analysis revealed that the strategies used to develop autonomous learning are generally effective, as the highest responses were: 35% of them are neutral, and 33.3% agree. However, 30.4% disagree to take the initiative to explore content outside their course. 37.6% agree that autonomous learning made them feel independent.

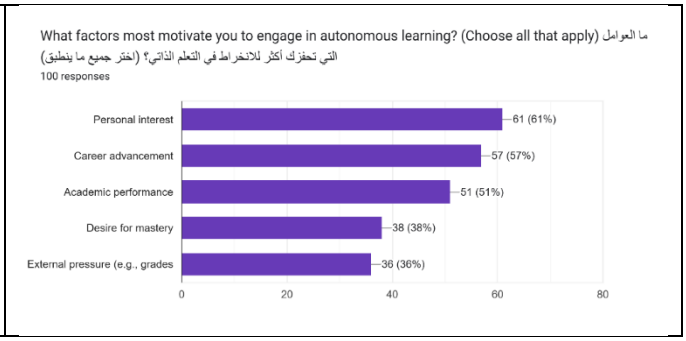




Motivation to Engage Autonomous

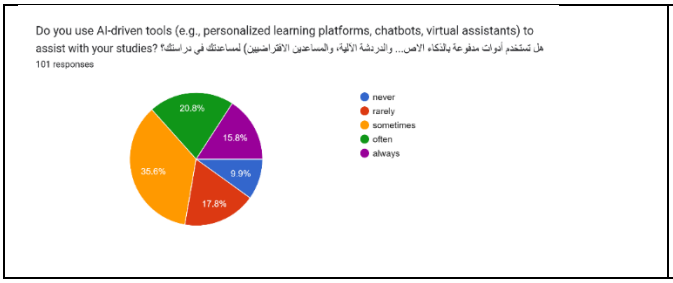
Feeling motivated to be an autonomous learner varies between students. The majority of them felt neutral (27.5%) while 23% feel demotivated and 20.6% feel motivated, 17.6% feel very motivated. Personal interest (61%), career development (57%) and Academic performance (51%) are the major factors that motivate learners to be autonomous

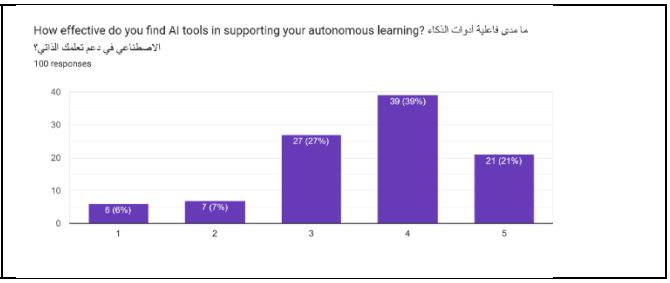




Use of AI Tools

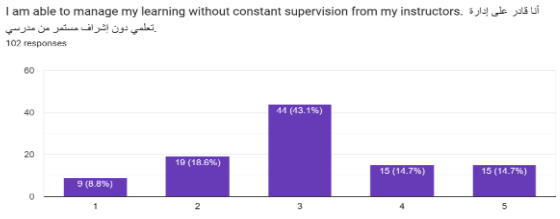
According to the use of AI tools 35.6% of learners sometimes use AI tools in their learning, and they are equally distributed between rarely (20%) and often (17%). However,39% found them effective in supporting their autonomy.

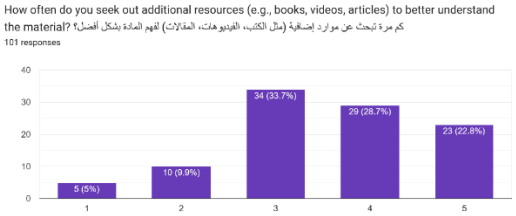




Measuring Students' Autonomy

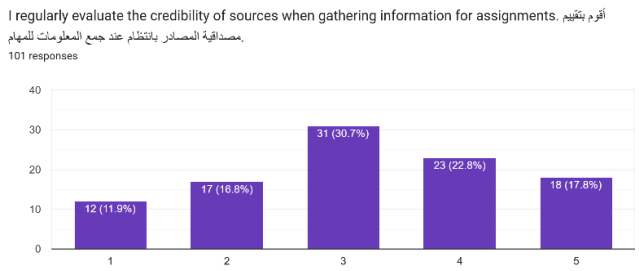
This section measures students' ability to be autonomous. It revealed that 43.1% of them are to some extent able to learn alone. 29.7% (neutral) and 27.7%(agree and very agree) that they have confidence to learn alone without help. Moreover, 33.7% sometimes, 28.7% agree and totally agree to search for other resources understand the material better. These results revealed that the majority of students at the secondary and university levels are equipped with autonomous learning skills

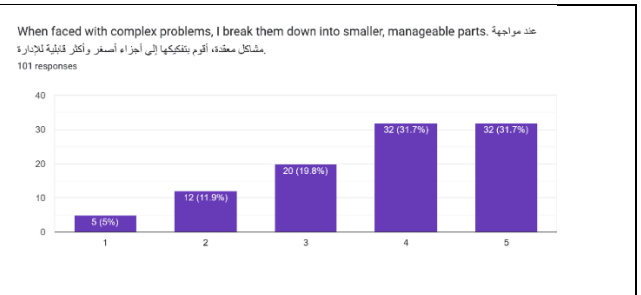


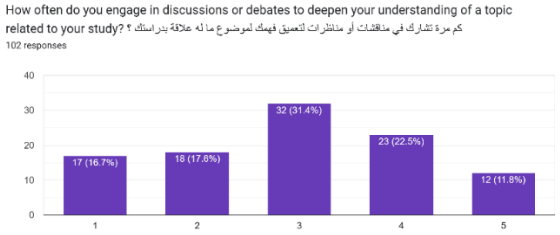


Critical Thinking Skills

This section evaluates the learner use of critical thinking skills. It revealed that 30.7% (sometimes) and 22%(agree) to evaluate the credibility of the resources during the assignments. 31.7% agree and strongly agree to break down complex problems into small ones. 31.4% (sometimes) and 22.5% agree to share in debates that deepen their understanding of the topics. Therefore, we can conclude that learners are equipped with critical thinking skills.

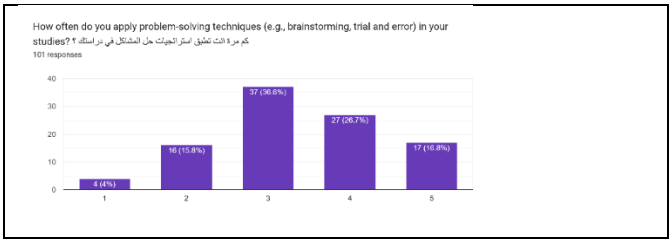


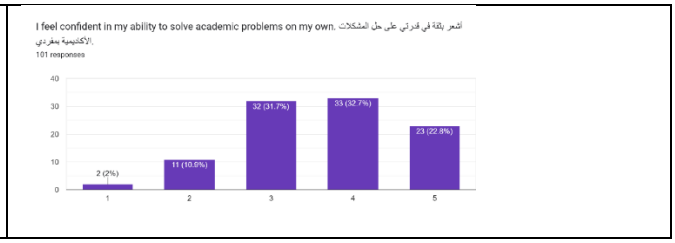




Problem solving Skills

This section evaluates learners' problem-solving skills. It revealed that 36.6 % sometimes and 28.7% agree to apply problem-solving techniques in their study. 32.7% agree that they feel confident in problem-solving alone. 33% agree that they have multiple solutions to solve problems. These results asserted that the students are equipped with problem solving skills.





Qualitative Analysis

This survey analysed learners use to AI tools and the challenges that they faced qualitatively using thematic analysis to the students' answers:

Students were asked about the most used AI tool, and their objective The survey responses indicate that ChatGPT is the most used AI tool for enhancing learning, with variations in its spelling suggesting its widespread recognition. Other frequently mentioned tools include Gemini, Google AI, Copilot, DeepSeek, Grammarly, and Perplexity, highlighting students' reliance on AI-powered search engines, writing assistants, and chatbots. Some students also use Litcharts, Duolingo, Google Translate, and Python, indicating a diverse approach to AI-assisted learning. A few respondents noted that they do not use AI tools at all.

The primary reasons for using AI tools in learning revolve around efficiency, clarity, and accessibility**.** Many students use AI to save time by quickly finding answers and summarizing complex topics. Others rely on AI for autonomous learning, particularly when they miss classes or need additional explanations. Language learning is another key benefit, with AI tools assisting in improving English skills, translating texts, and refining writing. Additionally, AI is valued for exam preparation, problem-solving, and generating study materials**,** helping students verify answers and explore alternative solutions.

AI tools also play a role in customized learning experiences, allowing students to engage with materials at their own pace and based on their individual needs. Some respondents appreciate AI's ability to enhance creativity, guide research, and improve critical thinking by offering structured explanations and alternative viewpoints. Moreover, AI platforms assist with academic writing, analysis, and theorem proofs**,** making them a valuable resource for students in various disciplines.

Despite the many advantages, a few students expressed concerns about AI's accuracy and effectiveness, noting that while it provides quick answers, some responses may be vague or less reliable. Nonetheless, the overall trend suggests that AI is becoming an essential part of modern learning, offering students personalized support, accessibility, and efficiency in acquiring and understanding knowledge

However, this survey asked the learners about the challenges they faced in being autonomous learners and how AI could be used to improve learning

The responses highlight several key challenges that learners face in autonomous learning. The most significant difficulties are time management and self-discipline. Many respondents mentioned that without external pressure, such as deadlines or supervision, it is easy to procrastinate, lose motivation, or struggle to balance learning with other daily responsibilities. The absence of a structured schedule often leads to inconsistency and difficulty in prioritizing tasks.

Another major challenge is the lack of motivation and accountability. Some learners find it hard to stay engaged without a teacher or peers to encourage them. Others expressed that studying alone can become boring or isolating, leading to a loss of enthusiasm over time. Group activities, interactive assignments, or deadlines often help maintain focus, which is missing in self-directed learning.

The difficulty in finding and evaluating reliable resources is another key issue. While the internet provides a vast amount of information, distinguishing between credible and misleading sources can be overwhelming. Some respondents noted that the abundance of sources can cause confusion, making it hard to decide which material is most relevant. Additionally, limited access to certain educational materials or poor internet connectivity can further hinder learning.

Many respondents also emphasized the lack of guidance and feedback as a challenge. Without an instructor to clarify difficult concepts, answer questions, or provide direction, learners may struggle to fully understand complex topics. Some mentioned that even with AI tools, there is still a gap in receiving immediate, accurate, and interactive explanations.

Another recurring issue is the inability to stay consistent. Some learners struggle with sustaining their efforts over a long period, leading to gaps in knowledge and incomplete learning experiences. This is especially true when dealing with unfamiliar or difficult subjects, as frustration can lead to giving up too soon.

External distractions, such as social media addiction, family responsibilities, and environmental factors, were also cited as barriers to autonomous learning. Learners may struggle to concentrate for extended periods without a dedicated study environment.

Lastly, a few participants pointed out that not all learners are suited for autonomous learning. Some individuals require structured instruction, interaction, and real-time support to fully grasp new concepts. This suggests that while autonomous learning has many advantages, it may not be equally effective for everyone

Moreover, another question highlights several key areas for improving AI tools to better support learning. Many participants emphasized the need for personalized learning paths where AI adapts to individual student needs, strengths, and weaknesses. By analyzing performance, AI could offer customized study plans, targeted exercises, and interactive quizzes to reinforce concepts. Additionally, respondents suggested that AI tools should integrate multi-modal learning**,** incorporating videos, mind maps, and interactive content to cater to different learning styles, especially for visual learners.

Another recurring theme was the credibility and accuracy of AI-generated information. Many users expressed concerns about AI providing incorrect or incomplete information. To address this, respondents suggested integrating AI tools with verified academic sources, improving real-time citation capabilities, and enhancing AI's ability to provide well-researched, reliable responses. Additionally, some proposed limiting AI's responses based on the student's educational level to ensure appropriate complexity in explanations.

Several participants also advocated for AI's role in fostering critical thinking rather than simply providing direct answers. Instead of offering solutions outright, AI could guide learners through problem-solving steps, offer hints, and encourage analytical thinking. This approach would prevent over-reliance on AI and help students develop independent learning skills. Another idea was for AI to send **regular** quizzes and review notifications to reinforce learning through repetition.

Integration with educational platforms and real-time collaboration tools was another suggested improvement. Some respondents proposed AI tools that seamlessly work with Google Docs, Microsoft Word, and learning management systems (e.g., Moodle or Blackboard) to provide live feedback on assignments and coursework. Others suggested AI-powered virtual assistants that could answer student queries effectively, making AI more interactive and responsive.

There were also discussions on the ethical and psychological impact of AI in education. Some respondents expressed concerns about over-reliance on AI, arguing that it should serve as a support tool rather than replacing

human thought processes. Others suggested developing AI that detects students' emotional states, such as frustration or boredom, and adjusts its responses accordingly.

Finally, several participants mentioned the need for AI tools designed specifically for education, separate from general-purpose AI. These tools could provide structured learning assistance, including video explanations from teachers, online tutoring sessions, and AI-driven learning communities. Additionally, awareness campaigns and training programs could help students and teachers better understand how to use AI effectively in education.

Overall, the feedback suggests that AI in education should focus on personalization, reliability, interactive learning, ethical considerations, and deeper integration with educational systems to truly enhance the learning experience.

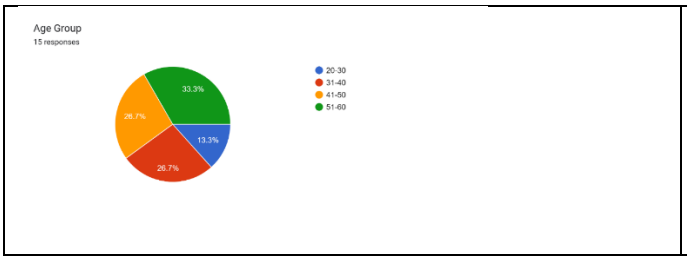
To sum up, the qualitative and quantitative research indicates that while strategies for fostering autonomous learning are generally effective and contribute to students feeling independent, a significant portion still struggle with taking initiative outside the curriculum. Motivation for autonomous learning varies, with personal interest, career development, and academic performance being key drivers, yet many students feel neutral or even demotivated. AI tools, particularly ChatGPT, are frequently used and considered effective for enhancing learning through efficiency, clarity, language support, and personalized experiences, although concerns about accuracy exist. Students generally possess autonomous learning skills and demonstrate abilities in critical thinking and problem-solving. However, challenges in autonomous learning include time management, self-discipline, motivation, resource evaluation, lack of guidance, consistency, and distractions, suggesting a need for AI to evolve towards personalized, reliable, interactive, and ethically sound support integrated with educational systems, ultimately fostering critical thinking, and addressing individual learning needs.

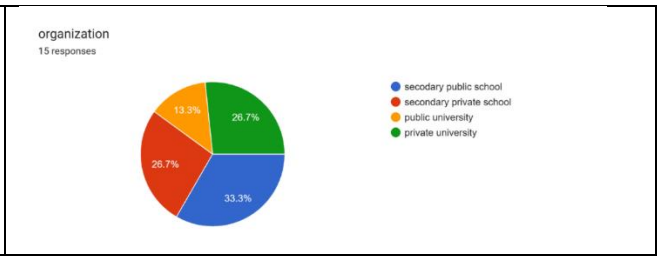
Educators' Survey Analysis

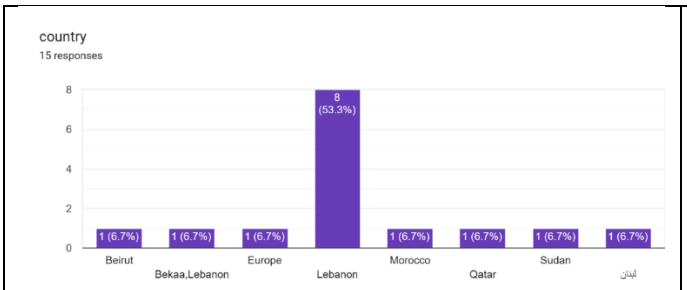
Quantitative

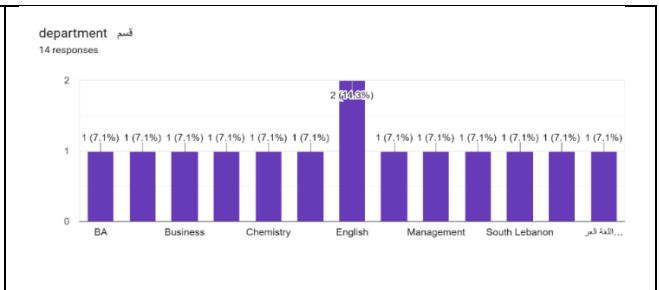
Demography analysis

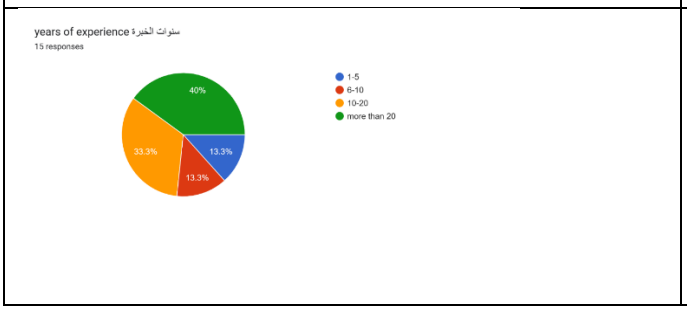
16 educators shared in this questionnaire their ages vary between 20 years and 60 years. They teach secondary and university level at public and private sectors. 11 of them are from Lebanon, whereas 5 where from Morocoo, Europe, Qatar and Sudan which act as indicator to generalise the results later. 40% of them have more than 20 years of experience, and they teach in different sectors: Arabic, Business, English, Biology, Chemistry, and Education. The results revealed that educators who shared in this research paper are experienced ,and they are from different regions. This helps us to reduce the restrictions and limitations of the study and to prove that autonomous learning is a prerequisite in all materials.

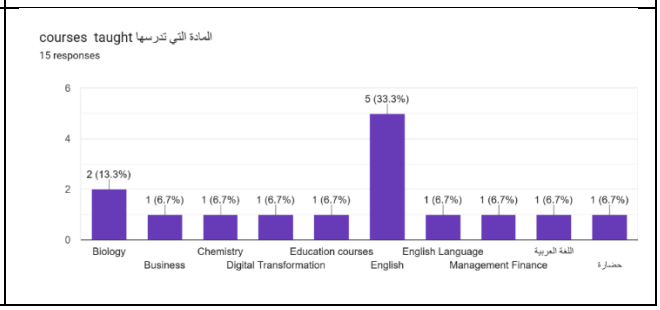






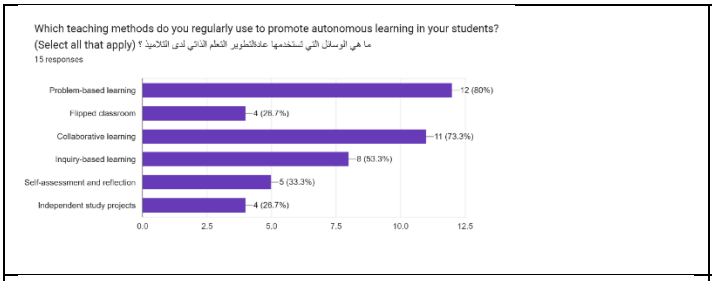


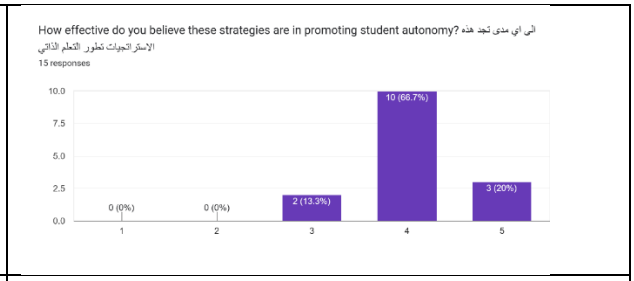


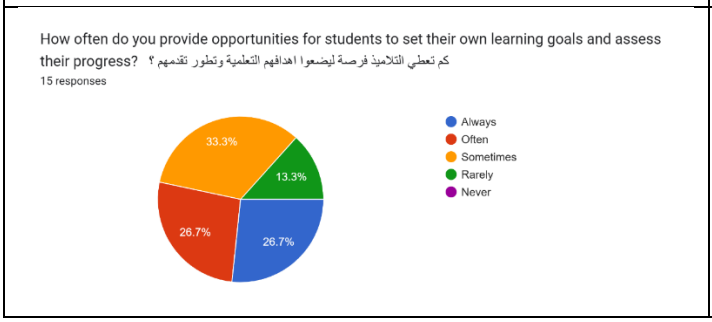


Teaching Practices

This section analysed quantitatively the teaching methods that teachers usually adopt in teaching, their effectiveness and to what extent they develop learners' autonomy. The results revealed that problem-based learning (80%) and use collaborative learning (73.3%) were mostly used, while flipped learning (4%) and the self-assessment method(33.3%) were the least used. 66.7% of teachers believed that these strategies are effective in promoting students' autonomy, and 33.3% said that they sometimes allowed the students to set their learning goals. These results asserted that teaching practices used are still teacher-based and autonomous learning was not given its right at the university and secondary levels.



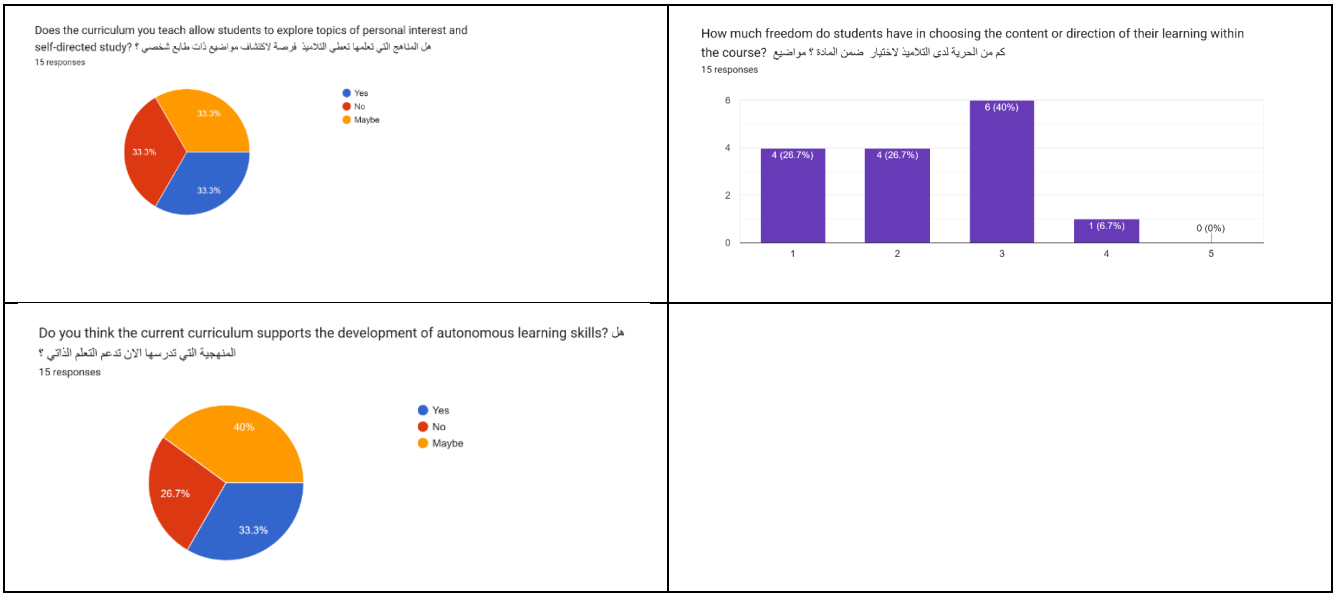




Curriculum Design and Autonomous Learning

This section analysed the educator's attitude towards the curriculum effect on developing autonomous learning .It revealed that responses are equally distributed (33.3%) that curriculum allow the students to explore topics of

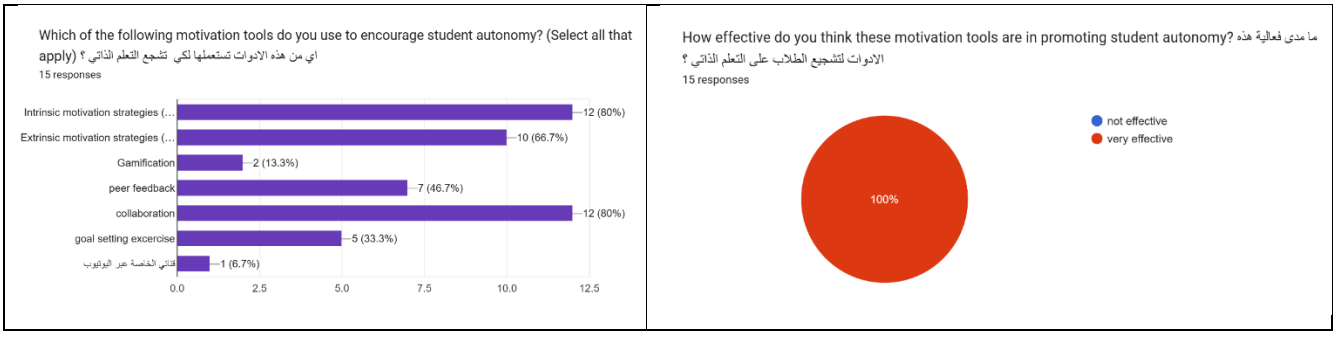
personal interest. However, 47% asserted that it doesn't give learners the freedom to choose the content or direct them towards the course. 40% of teachers asserted that this curriculum supported autonomous learning.



As conclusion, the curriculum is to a certain extent, supported autonomous learning. The problem is not with the topics or the teaching practice, but the problem is that the current curriculum is strict as it doesn't give the learners the freedom to direct their learning.

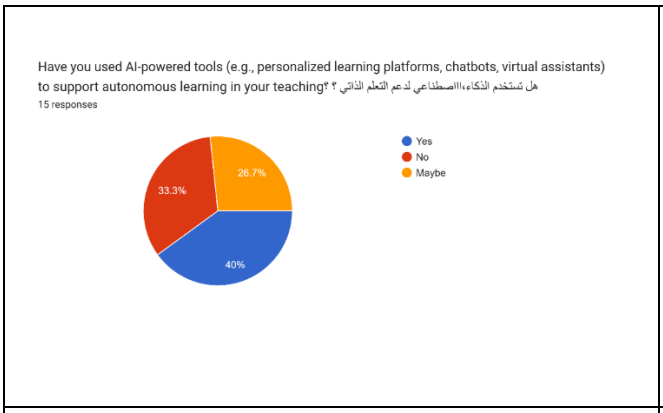
Motivation tools and student engagement

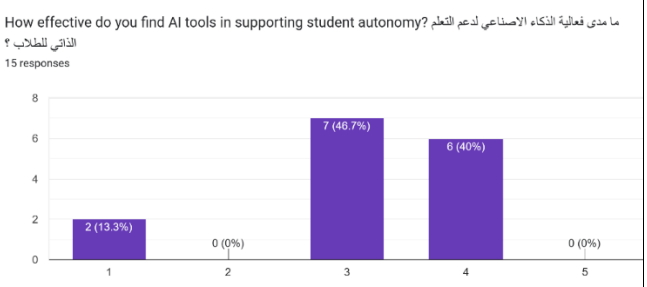
The teachers affirmed that intrinsic motivation strategies (80%), collaboration (80%) and peer feedback (46%), were mostly used to foster learners motivation while gamification (2%), and special YouTube channel were the least used . What was astonishing is that 100% considered that these strategies are motivational.

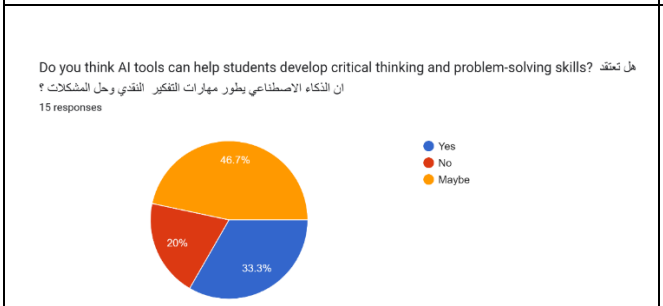


Use of AI and Autonomous learning

Teachers revealed that 40% of the teachers used AI tools to support learners, and 33.3% didn't . 46% of them believed that it is effective in supporting autonomous learning. 46% thought that AI tools could develop learners critical thinking and problem solving skills.

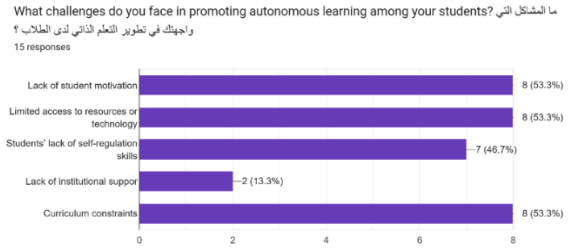






Challenges in promoting Autonomous learning

To analyse the challenges, we used quantitative and qualitative data. Quantitatively, lack of student motivation (53.3%), limited access to technology (53.3%) and curriculum constrains (53.3%) were the most common challenges.



Qualitative analysis

Based on the above questions, teachers responded to open-ended questions that were analysed qualitatively.

First, teachers were asked about the methods used to integrate skills like critical thinking and problem-solving into their curriculum. The responses highlight various approaches to integrating critical thinking and problem-solving into the curriculum. Many educators emphasize the importance of real-world connections by incorporating current issues, crucial topics, and real-life scenarios that encourage students to analyze causes and effects, propose solutions, and justify their opinions. Collaboration is also a key strategy, fostering 21st-century skills essential in the digital age. Some responses highlight discussion-based methods, such as open-ended questions, dialogue, and debates, to enhance students' analytical abilities. Additionally, structured academic tasks, including assignments, tutorials, and quizzes, are used to reinforce critical thinking through application and assessment. Overall, these

responses indicate a multifaceted approach that blends content, interaction, and assessment to develop students' problem-solving and analytical skills

Second, teachers were asked how they assess whether their students are motivated and taking responsibility for their learning. Assessing students' motivation and responsibility for their learning involves multiple strategies that gauge their engagement, effort, and self-direction. Many responses emphasise observing students' interactions, interests, and willingness to gather information beyond what is provided, as this reflects intrinsic motivation and deeper learning. Written reflections, such as free writing or connecting quotes to lesson topics, help reveal students' critical engagement and personal investment in learning. Surveys, both before and after the course, provide structured insights into students' perceptions and growth in autonomy. Classroom participation, assignment completion, and formative assessments serve as practical indicators of responsibility, while quizzes and teacher feedback help track progress and effort. While some educators acknowledge that only some students take full responsibility for their learning, these diverse assessment methods offer a comprehensive understanding of students' motivation and self-directed learning behaviors

Third, teachers were asked about the specific AI tools or technologies they have used in their courses to help students learn autonomously and the challenges they faced.The responses indicate that ChatGPT is the most commonly used AI tool for supporting autonomous learning, with multiple educators mentioning it as a key resource. Some also use additional AI-powered tools such as Gamma, Magic School, ClassPoint, and Eduaide, which offer interactive and engaging ways to facilitate learning. Interactive PowerPoint presentations and AI-assisted research tools like SciSpace are also mentioned, helping students explore topics independently. While some educators are still in the process of learning how to integrate AI effectively, there is a clear interest in leveraging AI technologies to enhance self-directed learning. The responses highlight several challenges educators face when integrating AI tools into their teaching practices. One major concern is the risk of students becoming overly reliant on AI, which requires careful and responsible integration to ensure they still develop critical thinking and analytical skills. Some educators also note that students lack the necessary skills in analysis, making it difficult for them to fully benefit from AI-driven learning. Technical barriers, such as unequal access to technology and the internet, pose another significant challenge, as not all students have the same opportunities to use AI-powered tools. Additionally, there are concerns about AI compatibility with certain subjects, as some materials may not align well with AI applications. Time constraints and the need to adapt AI tools to students' varying needs also present difficulties. Lastly, maintaining student engagement and participation, especially in virtual settings like Zoom, remains a challenge when integrating AI into online learning environments

Finally, teachers were asked how they faced these challenges , how do they balance between and about future improvements' responses highlight various strategies educators use to address challenges in integrating AI into teaching. Many emphasize motivation by showing students the benefits of technology and providing engaging content, such as videos, stories, and real-life applications. Collaboration plays a key role, with teachers encouraging group work, peer mentoring, and discussion-based learning. Some educators focus on gradually increasing student independence through structured support, self-assessment tools, and study groups. Others provide technological solutions via learning management systems and AI tools, while some work on training students to develop autonomous learning skills. However, a few challenges, such as access issues and AI alignment with certain subjects, remain unresolved.

Regarding factors that encourage autonomous learning, motivation, clear goals, and structured teaching strategies are essential. Peer collaboration, active listening, and interactive methods like brainstorming and gamification also play a role. Teachers balance guidance and student independence by adjusting their approach based on the activity, setting clear expectations, and using self-assessment tools like rubrics and reflection journals.

For future improvements, respondents suggest deeper integration of AI and technology in the curriculum, project-based learning (PBL), and making content more relevant to real-life applications. They also emphasize sustainability, assessing students' needs, and incorporating gamification to enhance engagement. These insights point toward a more dynamic, technology-driven, and student-centred approach to fostering autonomous learning.

To sum up, the mixed-method analysis revealed that teaching practices in this study predominantly rely on problem-based and collaborative learning, with less use of flipped learning and self-assessment, and while most teachers believe these strategies promote autonomy, they often don't allow students to set their own learning goals, indicating a still teacher-centered approach. The curriculum seems supportive of autonomous learning, but it limits students' freedom to explore personal interests and direct their learning. Educators employ various methods like real-world connections, collaboration, and discussion-based tasks to integrate critical thinking and problem-solving. Motivation is primarily fostered through intrinsic strategies and collaboration, with teachers assessing motivation through observation, reflections, surveys, and participation, acknowledging that not all students fully embrace responsibility for their learning. AI tools, mainly Chat GPT, are increasingly used by teachers who believe in their effectiveness for autonomous learning and developing critical thinking, but challenges include student over-reliance, lack of analysis skills, unequal access to technology, subject compatibility issues, time constraints, and maintaining engagement in online environments. The main challenges in promoting autonomous learning are identified as lack of student motivation, limited technology access, and curriculum constraints, which educators attempt to address through motivation techniques, collaboration, and gradual independence-building, suggesting future improvements lie in deeper AI integration, project-based learning, real-world relevance, and student-centered approaches.

5. Conclusion

Finding

This research paper aims to investigate three research questions: the teaching practices that help secondary and university learners to be autonomous, the strategies used to motivate learners to be autonomous, and the impact of AI in fostering learners' autonomy.

Teaching practices

Autonomous learning is related to a large extent with academic performance in higher education concerning developing learners' critical thinking and problem-solving skills. About one-third of students reported that strategies used for developing autonomy were effective, with many agreeing that autonomy made them feel independent. However, a significant portion (30.4%) disagreed about taking the initiative to explore content beyond their courses. Motivation to engage in autonomous learning varied among students, with many neutral or demotivated. Key factors that influenced motivation included personal interest, career development, and academic performance. Many students acknowledged using AI tools like ChatGPT for support but were neutral or disengaged about taking initiative outside the course material

Educators employed diverse teaching methods, with problem-based learning and collaborative learning being most commonly used. Although 66.7% of teachers felt these strategies promoted autonomy, the methods were still teacher-centered, with less emphasis on allowing students to set their own learning goals. Educators favored intrinsic motivation strategies and observed student engagement through participation, assignments, and assessments.

Despite these positive findings, students faced several challenges in autonomous learning. Key obstacles included time management, lack of motivation, difficulty in finding reliable resources, and the absence of guidance. Many students also struggled with maintaining consistency and focus due to external distractions like social media or family responsibilities. Additionally, some students noted that autonomous learning might not be suitable for everyone, as certain individuals require more structured instruction and support to succeed.

Regarding curriculum design, the survey indicated that while some educators think the curriculum supports autonomous learning, many believe it restricts students' ability to choose their own learning paths. Teachers integrate critical thinking and problem-solving into their curricula through real-world applications, collaborative tasks, and structured academic activities, though the curriculum itself often does not offer enough flexibility for students to direct their learning.

These findings affirmed Benson (2011) who asserted that it is essential for educational settings to apply a new strategy that centres on the students and gives them sufficient resources to learn on their own. It also agrees with Little (1995) who said that learning practices that help students gain autonomy are not. The results also goes in hand with Annamalai et al. (2025) and Nepas (2025) who stated that AI tools still have ethical problems

Strategies to foster Autonomous

The second research question investigates the strategies and teaching practices educators can use to foster autonomous learning and motivate students to adopt autonomous learning. The study revealed that educators employ a variety of teaching methods, with problem-based learning (80%) and collaborative learning (73.3%) being the most common. However, strategies like flipped learning and self-assessment were less frequently used, indicating that teaching practices are still largely teacher-centered. Most educators believe that these methods are effective in promoting student autonomy, but there is room for greater student involvement in setting their own learning goals.

Regarding critical thinking, most students demonstrated skills like evaluating the credibility of resources and breaking down complex problems into smaller tasks. Additionally, a significant portion of students felt confident in their problem-solving abilities, with 32.7% feeling confident solving problems independently and identifying multiple solutions.

To motivate students, educators commonly use intrinsic motivation strategies (80%) and collaboration (80%), with peer feedback also being important (46%). These strategies are seen as highly effective in encouraging student engagement and responsibility. Teachers assess motivation by observing student interest, participation, and the effort students put into independent learning.

Students reported varying levels of motivation, with 27.5% feeling neutral and only 20.6% feeling motivated to engage in autonomous learning. Factors like personal interest, career development, and academic performance were significant motivators. However, a notable number of students struggled with consistency and the lack of structured learning environments. Educators recognized the importance of intrinsic motivation, using strategies like collaboration and peer feedback to foster student engagement. Teachers assessed motivation through student participation, self-reflection, and assignments. Despite these efforts, educators noted challenges in motivating students and maintaining consistent engagement, especially in virtual learning environments.

These results affirmed Benson (2011), who asserted that a learner-centred approach develops independent inquiry and skill development. It also goes with Knowles (1975) and Zimmerman (2002), who highlighted the importance of collaborative learning and peer feedback, self-inquiry and learning journals to encourage learners to be autonomous. It also asserted Deci & Ryan's (1985) emphasis on intrinsic motivation to develop autonomy.

AI impact on developing learners autonomy

The third research question investigated how AI-personalized tools and platforms support autonomous learners and their impact on learners' autonomy. The use of AI tools was notable in the student survey, with Chat GPT being the most used AI tool. Regarding AI tools, 35.6% of students reported using AI tools occasionally, and 39% found them effective in supporting their autonomy. The most widely used tool was Chat GPT, followed by others like Grammarly, Google AI, and Duolingo. Students used these tools to enhance learning efficiency, clarity, and language skills, as well as for exam preparation and personalized learning experiences. Many students also felt confident in their ability to learn autonomously, with 43.1% reporting that they could learn alone to some extent, and many seeking additional resources to enhance their understanding. Students used AI for tasks like summarizing content, improving language skills, and assisting with problem-solving. However, students also expressed concerns about AI’s accuracy and over-reliance on technology.

Educators also used AI, with 40% incorporating AI tools to support learning. They specifically highlighted AI's role in promoting autonomous learning and enhancing critical thinking. While AI tools like Chat GPT were frequently mentioned, educators faced challenges related to students' over-reliance on AI and unequal access to technology

To improve AI tools, students suggested creating personalized learning paths, incorporating multi-modal content, enhancing the credibility of AI-generated information, and guiding critical thinking rather than just providing direct answers. They also recommended better integration with educational platforms for real-time feedback and emphasized the importance of ethical considerations in AI's role in education. Ultimately, while AI tools are seen as valuable, students highlighted the need for improvements to better support personalized, effective, and interactive learning experiences.

However, the integration of AI tools into teaching practices remains uneven, with 40% of educators using AI to support autonomous learning, and 46% believing that AI can enhance students' critical thinking and problem-solving skills. AI tools like ChatGPT, Gamma, and ClassPoint are used to facilitate independent learning, but challenges such as unequal access to technology, student over-reliance on AI, and curriculum alignment with AI capabilities persist.

These results asserted Siemens & Long (2014) emphasis on the role of digital tools as powerful tools of autonomous learning, providing learners with unprecedented access to information, resources, and learning opportunities. Additionally, it also asserted Benson (2011) who highlighted the role of digital resources to improve critical thinking and problem-solving skills—two crucial aspects of autonomy.

They also affirmed Holmes et al. (2019) and Benson (2011) who asserted that AI-powered personalized learning solutions can increase learner autonomy as it adjust learning to each learner's unique demands and learning preferences,. Moreover, the resukts asserted Paethrangsi et al.'s (2024) study affirmed that peer mentorship and group projects let students practice autonomy in a social context, whereas individualised feedback helps learners evaluate their progress and adjust strategies

Recommendation

This research paper revealed that developing an autonomous learner is still faced by many challenges for educators and students. The major challenges identified by educators in promoting autonomous learning include lack of student motivation, limited access to technology, and rigid curriculum constraints. Educators address these by motivating students with engaging content, fostering collaboration, and gradually increasing student independence. They also stress the importance of clear goals and structured teaching methods. For future improvements, educators suggest greater integration of AI, project-based learning, and the incorporation of real-life applications to make learning more relevant and engaging. These insights suggest a shift towards more dynamic, student-centered approaches in fostering autonomous learning. Similarly, the students identified challenges like time management, motivation, and the lack of structured schedules as barriers to autonomous learning. Issues like finding reliable resources, staying consistent, and external distractions also played significant roles in hindering autonomous learning. Thus to address these challenges , this research paper suggests the following recommendations:

Institutions can promote autonomous learning through a combination of motivational, curricular, technological, and pedagogical measures. To cultivate student motivation and engagement, educators should empower student-led learning, provide personalized feedback, and nurture a growth mindset; incorporating gamification, collaborative projects, and peer feedback—along with mentoring or study groups—can further increase involvement and accountability, while encouraging students to set personal learning goals and develop time-management skills. Enhancing curriculum adaptability requires more flexible, learner-centred designs that include project-based learning, open-ended assignments, debates, and guided-choice projects so students can pursue interests while meeting clear objectives. Leveraging AI effectively means training educators to integrate AI tools (e.g., ChatGPT) in ways that enhance critical thinking, problem-solving, and research skills, while also teaching

students the ethical and responsible use of AI through workshops and guided practice. Addressing barriers to technology and access is essential: institutions should prioritize digital equity, adopt blended learning models, provide offline or low-tech resource alternatives, and ensure students without reliable internet or devices still have viable self-directed learning materials. Investing in professional development for educators—focused on autonomy-supportive strategies, new pedagogies, and technology (including AI)—and facilitating peer-sharing of best practices will enable teachers to better train students in self-assessment, time management, and independent research. Fostering collaborative learning and peer interaction through small-group work, peer tutoring, and meaningful discussions helps students learn from one another, develop communication skills, and build responsibility for their learning; peer feedback and study groups promote reflection and improvement. Providing clear guidelines and structured autonomy—by communicating expectations, deadlines, and assessment criteria while allowing flexibility in how students meet objectives—gives learners the direction they need to self-regulate; tools like self-assessment rubrics and reflective learning journals support this process. Finally, promoting the real-world application of learning through case studies, internships, community service, and hands-on projects helps students see the relevance of their studies and increases engagement. Overall, fostering autonomous learning demands a multifaceted, equitable approach that combines pedagogy, technology, support systems, and clear structure to empower students for academic success and real-world readiness.

In conclusion, cultivating autonomous learners requires intentional design across motivation, curriculum, technology, teacher development, collaboration, structure, and authentic application; these elements must be implemented with attention to equity and ethical use of tools. Future research should investigate the long-term effects of AI-supported learning on autonomy and academic integrity, identify the most effective combinations of pedagogical practices (for example, PBL + AI + peer mentoring) for sustaining intrinsic motivation, evaluate the impact of low-tech alternatives and digital-equity interventions in under-resourced contexts, assess which professional development models most effectively enable teachers to implement autonomy-supportive practices, and determine how different assessment types (formative vs. summative, peer assessment) foster durable self-regulation and metacognitive skills. These studies will guide evidence-based policies and practices to ensure technology augments—rather than replaces—the human dimensions of teaching and learning, producing inclusive and effective outcomes for all students.

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