Arab World English Journal
INTERNATIONAL PEER REVIEWED JOURNAL ISSN: 2229-9327

Arab World English Journal (AWEJ) Volume 15. Number 3, September 2024 Pp. 217-234
DOI: https://dx.doi.org/10.24093/awej/vol15no3.13

Integrating the 6Cs in Moroccan Higher Education: A Framework for Inclusive AI Learning Design

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Received:06/19/2024 Accepted:09/11/2024 Published: 09/242024

Abstract
Aligning market demands with the knowledge, competencies, and skills provided by higher education is a significant challenge and often falls primarily on the shoulders of educators. This study aims to explore the concept of inclusive AI learning design and its intersection with the integration of the 6Cs framework in higher education. In other words, it delves into the multifaceted role of Artificial Intelligence in the classroom, focusing primarily on the integration of the 6Cs (communication, collaboration, critical thinking, creativity, character education/ connectivity, and culture/ citizenship) in Moroccan higher education institutions, Artificial Intelligence literacy, and the cultivation of digital humanities techniques. The main research question guiding the study was "How to integrate the 6Cs at the tertiary level using inclusive Artificial Intelligence learning design?». The study held significance in contributing to the existing literature by providing new insights and filling gaps in knowledge. To achieve the objectives of the study, the researcher relied on an exploratory descriptive approach through an interview and a self-developed questionnaire involving 15 ESP teachers. The results indicated that teachers face several challenges when integrating the 6C of 21st-century education into ESP classes, including engineering students' low motivation, difficulties in combining multiple competencies, limitations in teaching materials, and time management issues. Hence, establishing a framework for inclusive Artificial Intelligence learning design that encompasses the 6 Cs is compulsory.

Keywords: 6Cs of the 21st century education, challenges, solutions, framework for inclusive AI learning design
Cite as: BELKBIR, R. (2024). Integrating the 6Cs in Moroccan Higher Education: A Framework for Inclusive AI Learning Design. *Arab World English Journal*, *15*(3): . 217-234. https://dx.doi.org/10.24093/awej/vol15no3.13

Introduction

English Language Teaching in Morocco is a fluctuating industry that has known various adjustments since independence. To inaugurate a new era of progress and modernization aimed at enhancing the quality and efficiency of Higher Education in Morocco, a series of reforms have been implemented. The strategic vision of reforms 2000, 2004, and 2015- 2030 are the most famous ones which are perceived as comprehensive work plans for refining the quality of the Moroccan national system. These reforms also include the launch of the National Acceleration Plan for the Transformation of the HESRI Ecosystem (PACTE HESRI, 2030). Its primary goal is to establish a new model for Moroccan universities, covering four core dimensions: a comprehensive pedagogical reform, the establishment of scientific research in line with international standards, a governance system combining transparency and efficiency, and finally the integration of new information and communication technologies into Moroccan higher education within the framework of a national digital strategy.

To effectively embark on the ever-evolving landscape and address the challenges of the 21st century, teachers should integrate the 6 Cs framework into the teaching and learning process. This framework encompasses communication, collaboration, critical thinking, creativity, character education/ connectivity, and citizenship/ culture. In other words, students should develop global awareness, cultural humility, and intercultural communication skills, the needed appreciation and recognition of different cultural beliefs, the ability to cooperate with individuals from various backgrounds as well as the ability to adapt to cross-cultural work environments (Fadhilawati et al., 2023).

Having regard to the above, it is indisputable that universities take into consideration students' six competencies to meet upcoming professional challenges in the job market. Using English for Specific Purposes is closely related to the working environment. Students are interested in ESP not only because of the importance of the English language but also because of the need to fulfill certain tasks by using the language. As a result, training programs should try to review potential upcoming scenarios to equip engineering students with the right tools to find a job, but this is not straightforward since the future is not part of the course. Several preliminary studies were conducted, and they predominantly pinpointed the implementation process of the 4Cs in the classroom, whereas the present study analyzes six competencies rather than just four. Also, despite the increasing interest in AI, the existing literature points out a notable gap in well-defined frameworks for teachers that can allow them to utilize the essential AI tools needed to effectively integrate the 6 Cs (Ng et al., 2021; Polak et al., 2022). Hence, the paper aims to investigate the integration of the 6Cs (communication, collaboration, critical thinking, creativity, character education/ connectivity, and culture/ citizenship) in Moroccan higher education institutions using a framework for inclusive AI learning design. The study attempts to answer the following research questions:

- What is the perception of ESP teachers towards the inclusion of the 6 Cs in the curriculum?
- What is the perception of ESP teachers towards the teachability and assessment of the 6 Cs?
- What are teachers' preferences among AI tools to facilitate the integration of the 6 Cs?

Literature Review

In the evolving landscape of education and professional development, the concept of competencies has gained significant traction. Rather than focusing solely on academic

achievement, competencies encompass a broader spectrum of skills and qualities that are essential for success in various facets of life. The framework of six competencies (communication, critical thinking, creativity, collaboration, citizenship/culture, character education/connectivity) provides a comprehensive guide for both educators and learners alike.

Communication

Communication skills have long been a concern within the industry. It has been defined by Coffelt and Grauman (2016) as the « traits, qualities, and attributes, such as public speaking, leading meetings, or negotiations of a contract » (p.4). The crucial role of verbal communication is firmly linked to the attributes of the engineering profession. For instance, engineers tend to focus on the technical aspects, whereas clients are often interested in solving problems. Yet, they must have the minimum fundamental oral skills to communicate not only with the employers but also with stakeholders. The 21st-century workforce is changing significantly and there are high expectations of students joining the job market to possess good communication skills (Mitchell, 2008). Without sufficient skills to communicate, it becomes strenuous to develop interpersonal relationships in work settings. As reported by the OECD (2015), communication, in general, is reached with efficient and accurate speaking and interpretation.

Critical Thinking

Learning does not only refer to rote learning which deals mainly with the memorization technique based on repetition. In the field of engineering, Pereira and Krippahl (2007) revealed that engineers will have to make important decisions, solve technical problems, face ethical balances, employ best practices, and report/ document their findings and products, as well as act in a consultant capacity. There are diverse definitions for critical thinking, but each necessitates critically judging the validity and reliability of the information. Angelo (1995) concurred that "most formal definitions characterize critical thinking as the intentional application of rational, higher order thinking skills, such as analysis, synthesis, problem recognition and problem-solving, inference, and evaluation" (p. 6). The ability to solve problems requires critical thinking and rational decision-making to come up with applicable solutions.

Creativity

Creativity is the next stage of critical thinking ability. The ability to think creatively is required to find solutions to potential problems in any field. Beyer (2008) listed six aspects of creative thinking, and these are (1) dispositions in which critical thinkers are cynical, non-judgmental, value fair-mindedness, take cognizance to corroboration and reasoning, respect coherence and precision, look at different opinions, and will shift orientations when reason necessities them to do so; (2) criteria refer to the guidelines that must be met to judge something logically. Although each field has its criteria, some standards are universal. On this basis, Beyer (2008) pointed out that "an assertion must be based on relevant, accurate facts; based on credible sources; precise; unbiased; free from logical fallacies; logically consistent; and strongly reasoned; (3) argument is an idea with supporting evidence" (p.12). To put it in a nutshell, as students move closer to the world of work, job performance becomes progressively based on dealing with problems and making decisions. To achieve this goal, educators have to structure instructional time to assess the level of thinking and analysis that students are showing. Also, they can minimize their guidance gradually as students learn to train them to simplify and solve complex situations.

Collaboration

The interdisciplinary nature of today's job market highlights the importance of collaboration. Literature shows that collaboration is a crucial element in the success of any organization. It increases flexibility and responsiveness within companies (Griffith et al., 2003). Salas et al (2005) stated that collaboration is "a set of interrelated thoughts, actions, and feelings of each team member that are needed to function as a team and that combine to facilitate coordinated, adaptive performance, and task objectives resulting in value-added outcomes" (p. 562). To put it the other way around, collaboration contributes to the growth of the company and permits organizations to carry out tasks at a steady pace. It also increases creativity, motivates employees, and reduces the pressure on every member of the team. Researchers and experts provide a variety of ideas for teaching collaboration. One approach for developing the skill necessary to collaborate with others is known as team-based learning. To work cooperatively, ESP teachers should create learning situations in which students' success is linked directly to the performance of members in a group.

Citizenship/ Culture

Culture (Miller, 2015) or Citizenship (Fullan & Duckworth, 2015) can be described as students' ability to be aware of their surrounding environments. Culture and citizenship are not so different when we look closer. Individuals need to be in touch with everything surrounding them—both culture and community (Miro Inc., 2021). It involves realizing different cultures, knowing and appreciating where they come from as well and respecting the values and beliefs of the communities they live in. It is crucial to integrate this competence since it can benefit students globally by preventing them from negative attitudes and stereotypes. Nunan (1989) reported

> if you learn English but cannot speak it fluently, you are like a blind being on the street. You [will] lose many precious opportunities to enjoy the beauty of this world. You are kept inside a dark box. But if you speak [English] well, you will learn about culture, people, and life. You feel your life colorful and meaningful. You are not isolated. (p. 4)

Character Education/ Connectivity

In this information age, students must have a good character which highlights ethical values and nurtures individuals' global awareness. Ethics and moral skills play a significant role in sharpening engineers' brilliant personalities by complementing their technical skills. Peltton and True (2014) caught the quintessence of ethics, describing them as issues related to personal qualities, organizational integrity, and ethical leadership that are perceived as the cornerstone of any company. Smola and Sutton (2002) addressed the topic of character education in the workplace. They stated that younger employers fail to provide adequate work ethic or connection in their organization, whereas the older generation tends to do what is in the best interest of the company. Ezigbo (2012) recently approached the competency of character education via a study about the assessment of ethical principles in the workplace. He affirmed that work ethics are a key component to the success of a business because they help employees decide how best to address the interests of any organizational stakeholders. They also explained that certain variables influence employees' decisions, such as the amount of time spent on the job, commitment to others, and professionalism.

6 Cs Teaching through ESP Classes

The 6Cs appear to be difficult to teach and even harder to evaluate in the classroom. There are many methods to teach them. For example, Kechagias (2001) pointed out that there are two different schools of thought in the teaching and the development of 21st-century skills: the '*generalists*' and the '*specifists*'. The *generalist* practice was first introduced in the 1970s and argued that the 6Cs are non-specific and can be taught separately from the course content and implemented in any field of study. For instance, this approach claims that the feature of problem-solving is global and it encompasses engaging with customers, identifying problem areas, and coming up with an intervention plan. As a consequence, it can be applied to any disciplinary context. On the other side, according to Laker and Powell (2011), the *specifists/relativist* approach is another approach to teaching a set of dispositional attributes and it is seen as comprehensive since it is recognized as more complicated to be transferred in practice than technical skills. It aims at embedding the 6Cs into each course because they cannot be taught in one single shot and becomes, by extension, the role of the teacher along with the expertise of specialists.

Along the same lines, another European project developed by the European University College Association in 2009 concerning transversal competencies is "Mediating the 6 Cs at Higher Education Institutions" (ModEs), financed by the EU program "Lifelong Learning Erasmus" whose main aim is to identify comprehensive methodologies for teaching the 6 competencies. These methodologies are arranged into three main categories, and they tackle both university teaching methods and company training techniques: expository, guided, and active strategies. This project contributed to the design of a book that contains certain instructions on how to teach the 6 Cs at the undergraduate level, and a framework of a "serious game" in various languages to develop these skills. A further project was also carried out in 2015 and is still going on entitled "eLene4work" (e-Learning for work). It has in view helping students develop the competencies chiefly required by companies to bridge the gap between the university and the job market using MOOCs (Massive online courses) and OER (Open Educational Resources).

6 Cs assessment in ESP classes

Scholars agree that 21st-century skills are a major asset for graduates when competing for job openings (Winstead et al., 2013; Cinque, 2016; Moubtassime, 2020, Erradi & Belhorma, 2024). Across disciplines, there are various ways to integrate these skills into the engineering curriculum. The main approaches include modeling behaviors and fortifying skills through practice. Sharpening engineering students' competencies will play a significant role in post-graduation success. Hence, there is an urgent need to develop a curriculum that would get rid of the barriers that hinder students from employing their skills. Concerning the field of engineering, there are three main models used in 6Cs training. The *in-house* training model is essential in every vocational school. The faculty teachers of this model are usually highly qualified and are in continuous contact with their students, which allows them to ask for help whenever they need guidance. These teachers do not only master the English language but are also effective soft skills trainers. The *outsourcing* training model is a strategy in which an educational institution utilizes an external supplier for the management of training processes. These professionals have extensive experience and employ innovative teaching approaches. The *hybrid* training model is the name given when merging two training methods from different spheres to create a great all-embracing result. It involves training by in-house faculty throughout the first and second years, with special

assistance from very professional trainers from an outsourcing agency during the final year, which will surely improve the employability skills of an engineer (Pattyn & Brans, 2013).

In the Moroccan context, incorporating six core competencies—communication, creativity, critical thinking, collaboration, citizenship/culture, and character education/connectivity—into higher education in Morocco through AI-based learning design can revolutionize student learning outcomes. AI-powered adaptive learning platforms, simulations, and intelligent tutoring systems can challenge students' critical thinking and problem-solving abilities, while AI-enhanced group projects and virtual agents can improve collaboration by facilitating team dynamics and project management. Creativity can be nurtured through AI tools for content generation and interactive creative labs, while AI-driven language tools and virtual assessors can improve communication skills. Citizenship can be improved using personalized AI-driven training platforms and cultural labs. Additionally, AI-powered learning analytics can promote character education by offering personalized feedback and learning paths, helping students track progress and set goals (Saimon et al., 2024). Implementing AI in curriculum mapping, pilot programs, and faculty training will ensure that Moroccan higher education fosters essential 21st-century competencies. This is an area that has been largely overlooked in the existing literature.

Method

A mixed-method approach was used to achieve the study's goals. The quantitative data gathered through the use of questionnaires allowed the researcher to present percentages to deduce the relationship between the variables of the study. Qualitative data were collected using teachers' interviews, to support the findings of the quantitative data and to get more evident information. Combining the two methods improved the data's validity and dependability and the results' quality.

Participants

The ESP teachers were chosen because they were the key people who were provided with the knowledge and tools to deal with their students' fields of study. A purposeful sampling technique was used to select the ESP teachers during the academic year of 2023-2024. This type of sampling is most commonly used in qualitative research to select information-rich cases from a group of individuals who are knowledgeable about the study in mind (Creswell, 2003). This procedure allowed the researcher to discern a profound understanding of the teachers' opinions of the problem being investigated. They were two female and 13 male ESP teachers aged between 28-50 years old from the National School of Applied Sciences of Fez, the National School of Applied Sciences of Oujda, the National School of Arts and Crafts of Meknes, and EUROMED of Fez. All of them held a Ph.D. degree in teaching English as a foreign language and had more than 2 years of ESP teaching experience. Their selection was stimulated by the fact that they were always in touch with students and could detect their needs by assessing their abilities in using English in both academic and professional settings. They would also be likely to observe the challenges and difficulties that students encountered while teaching the 6 Cs.

Research Instruments

To reach the objectives of this study, the researcher used a questionnaire as a means to collect quantitative data, and an interview to gather qualitative data to achieve dependable results.

Questionnaire

In this study, the researcher relied on a self-developed questionnaire for ESP teachers in various engineering institutions in Morocco (ENSAF, ENSAM, ENSAO, and EUROMED) based on a careful review of literature on the perceived 21st-century skills required in an academic context and target careers. Most of the items included in the questionnaire are closed-ended questions. The number of teachers who completed and gave back the questionnaire was 15. Section 1 included the following demographic data: gender, years of teaching English for Specific Purposes, the highest level of education, the type of school in which they are teaching, and the classes they are currently teaching. Section 2 was comprised of the 6 competencies, namely, 1) communication, 2) collaboration, 3) critical thinking, 4) creativity, 5) character education/ connectivity, and 6) citizenship/ culture. The respondents were asked to indicate the level of importance of each competency in affecting the success of prospective employees in the workforce. A five-point Likert scaling was used to assess the level of importance (5= Extremely important, 4= Very important, 3= Important, 2= Slightly important, 1= Not important. Section 3 was devoted to evaluating the frequency of the 6 competencies integration into the ESP courses. They were required to choose from four options (4=Never, 3= Periodically, 2= Weekly, 1= Daily). In addition, the respondents tried to list some techniques that could be used to develop these competencies and provided their perceptions of the teachability and assessment of those skills. Those who wished to take part in the qualitative instrument of the research checked the last section of the questionnaire and provided the researcher with their contact information.

Interview

The researcher also conducted semi-structured interviews with selected participants. To obtain a deeper insight into the challenges of 6 Cs integration, the teachers in charge of the module of English were asked to describe the contexts in which their students used the 6 Cs as well as suggest some AI tools that can facilitate the incorporation of these competencies. The interview lasted approximately 45 minutes for each participant. Online recorders and researcher notebooks were used throughout the interview process to assist with data collection and to avoid missing data being disclosed by participants.

Research Procedures

After the data was collected, the data was analyzed in two steps. First, the items included in the questionnaire were reviewed by four university professors with expertise in 21st-century skills to ensure its validity. An important number of revisions and modifications were made before piloting the near-final version of the questionnaire. The variables constructed in the research instruments are subject to reliability tests. Cronbach's alpha test is used to measure the internal consistency of the instrument used. The results indicated that Cronbach's Alpha value exceeded 0.70, which is an acceptable level. So, the items constituting each variable for the study have a reasonable internal consistency. Second, the results of the interviews were transcribed and analyzed.

Data Analysis

The data collected for the study were analyzed in terms of quantitative and qualitative analysis. The researcher analyzed the quantitative data collected from the questionnaires using SPSS, for extracting frequencies and percentages. As for the qualitative data, they were analyzed thematically. To ensure that the participants were providing significant data, the researcher asked

them to mention real-life situation examples or anecdotal descriptions to better back up their answers and avoid ambiguous statements.

Results

Findings of the Questionnaire

The Importance of 6 Cs for ESP Teachers

The means of the participant's responses were computed and used to rank the importance of the 6 Cs from the most to the least. Communication was the competency which received the highest rate (M= 4,73, SD= 0,458). Also, it was clear that collaboration and character education/ connectivity received the same rate of importance which is (M=4.27, SD= 0.458) and (M= 4.27, SD= 0.594) respectively. These competencies were closely followed by critical thinking which stood with a standing rate of (M= 3.80, SD=0.676). Concerning creativity, the respondents' mean scores (M=3.60, SD= 0,737), and finally, citizenship/ culture (M=3.07, SD= 0.458) is perceived by teachers as the sixth skill in its level of importance with a minor difference in means. Table One presents some of the important competencies required to be developed in students.

Table 1. *Descriptive statistics for the importance of 6Cs for teachers*

6Cs	Mean	SD
Communication	4.73	0.458
Collaboration	4.27	0.458
Critical thinking	3,80	0.676
Creativity	3.60	0,737
Character education/ Connectivity	4.27	0.594
Citizenship/ Culture	3.07	0.458

The Integration Frequency of the 6 Cs in ESP Curriculum

In response to a question as to how often the 6Cs are integrated into ESP teachers' programs, the opinions were divergent. The values were derived from the following options: daily, weekly, periodically, or never. The data revealed that ESP teachers had the highest daily competency concept integration percentage in communication (73,3%), character education (60%), and critical thinking and collaboration (53,3%). The least commonly developed competencies are creativity and citizenship. The explanation for why these three are rarely integrated into an ESP classroom may be because they are closely related to corporate reality and require thorough knowledge about business policies, which is not easy to learn from a teacher. Table Two (see appendix) displays the frequencies and percentages of the integration of the 6Cs into the ESP program.

Perceptions of Teachers towards the Teachability of 6 Cs

Despite the debate by some scholars (Heckman, (2006); Willmot and Colman (2016)) that the 6Cs are acquired through inculcation, are developed in early childhood education, and are hard to teach and evaluate, many educators endorse the idea that these competencies are intended to enable and enhance personal lifelong learning. Hence, ESP teachers have a heavy responsibility to provide students with the experience they need to aptly pursue meaningful career paths at the university level. This can be achieved through establishing pertinent alignment among the process of teaching, learning, and assessment. While deciding about the teachability of the six Cs in ESP

classrooms, most of the teachers thought that it was a continuous and life-long process. From Figure One, all the presented elements of the 6 Cs as 'teachable' were considered by 13,3% to 80% as rational to make them teachable in the context of higher education, whereas 20% to 86,7% of them perceived these competencies as not 'teachable'. These results imply that the six Cs are not easy to teach and transfer in practice. This idea is confirmed by Moubtassime (2020) who stated that soft skills should be taught at different stages, i.e., primary, secondary, and higher education with the assistance of parents to work together to help students develop these skills in chronological order. The six Cs are very inimitable in terms of how they are taught and learned because they are interactive tendencies and specific qualities that differentiate one employee from another.

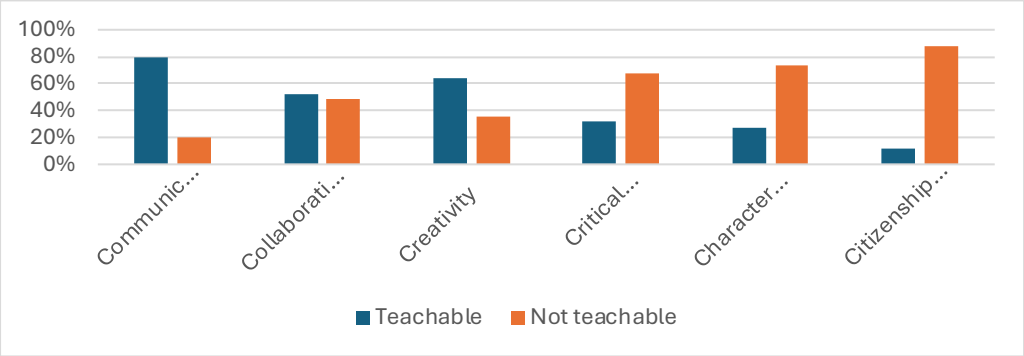


Figure 1. Perceptions of teachers towards the teachability of 6 Cs

Perceptions of teachers towards the assessment of 6 Cs

In addition to the issue of the teachability of the 6 Cs, there is also the issue of measurability. Unlike technical skills, which can be assessed either by exams or intelligibly by observing employees' job performances, the 6 competencies are not easy to quantify. As a consequence, assessment practices must align with those of the educational curriculum, and ESP teachers may need to adopt avant-garde methods of following students' improvement to appropriately seize growth in 21st-century skills. When asked to give their opinion regarding the assessment of the 6 Cs, there was no consensus among the respondents. In Figure Two, 22% to 90,1% of the participating teachers asserted that the 6 Cs can be assessed as they are manageable to teach as the researcher indicated above. Yet, another section of teachers (9,9% to 78%) were of the firm idea that they cannot be assessed. Thus, the implication derived is that the majority of teachers indicated that the 6 Cs can be assessed at the tertiary level. The findings support the conclusion of Cook (2015) who observed that despite the importance of the 6 Cs; they are not only difficult to teach, but also complex to teach since the methods that could be suitable in one context may differ when used in another. Morocco is currently undergoing a shift towards competency-based education and training. As a consequence, teaching practices should change too to produce competent graduates at all levels of education.

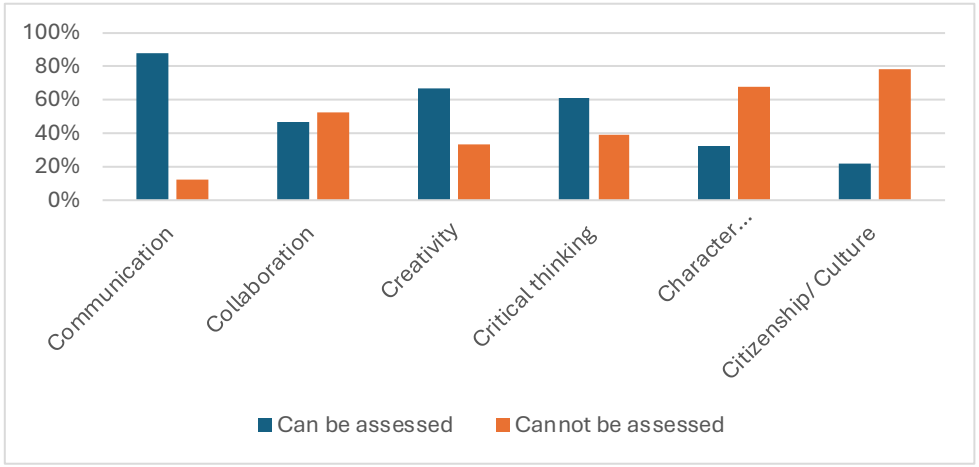


Figure 2. Perception of teachers towards the assessment of 6 Cs

Methods for integrating the 6 Cs into the ESP curriculum

Concerning the methods that could be used to integrate the 6 Cs into the ESP curriculum, the majority of the participants (90%) stated that these competencies could be developed through experiential learning. It allows students to connect theory with practice. The concept of learning through experience is not new. In 1938, John Dewey mentioned in his article *Experience and Education* the necessity of familiarizing 'learning by doing' in the field of education. He emphasized the two requisite principles in experiential education: continuity and interaction. The second method that was suggested by ESP teachers is coaching and mentoring with a percentage of 85%, followed by real-life examples (80%). 70% of the respondents also said that student collaboration could foster the 6 Cs in students. As for seminars and projects, 62% of the participating teachers would prefer that universities organize seminars or academic visits as well as combine English language skills with professional training to help students acquire the multilingual competencies needed in the job market. The results obtained in this respect are presented in Figure Three.

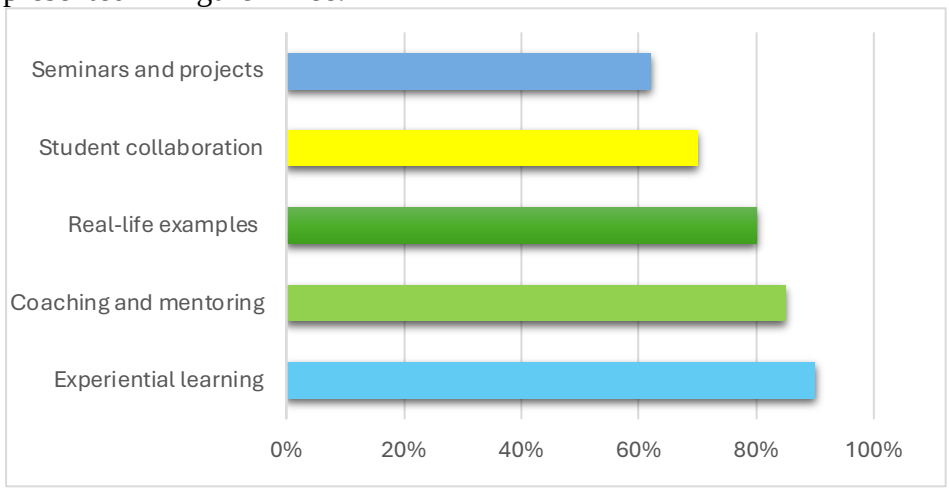


Figure 3. Methods for integrating the 6 Cs into the ESP curriculum

Teachers' Preferences Among AI Tools

Chat GPT emerged as the leading choice, with 37% of survey participants reporting its use. Its popularity is largely due to its versatility and extensive media coverage, making it a familiar option for many. As the first generative AI tool, it also benefits from a first-mover advantage. Claude was the second most popular AI tool, used by 24% of respondents, highlighting a strong preference for conversational AI tools and the growing trend of using AI for communication and content creation. Copilot and Google Bard had adoption rates of 18% and 13%, respectively, indicating moderate acceptance. The "Others" category, which includes various less common AI tools, was selected by 8% of respondents, reflecting a range of AI tools being explored and used to meet specific needs and preferences beyond the mainstream options. (see Figure Four).

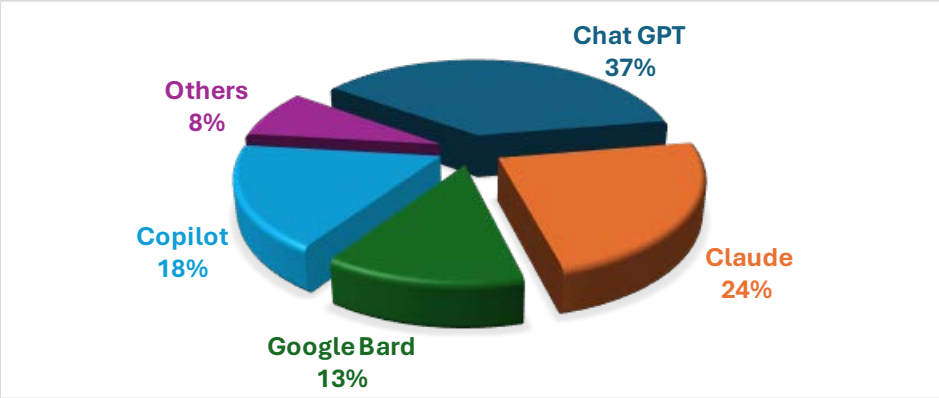


Figure 4. Teachers' preferences among AI tools

Findings of the Interview

To obtain a deeper insight into the needs of students, the teachers in charge of the module of English were asked to describe the contexts in which their students used their 6 Cs, the challenges they faced while acquiring them, and how these competencies can be inculcated in ESP courses using an inclusive AI learning design. The following key themes were identified, analyzed, and presented with supporting narratives and quotes from the interview transcript:

a) Problems for teachers in integrating the 6C of 21st-century education into ESP classes,
b) Solutions expected by teachers in integrating the 6C of 21st-century education using AI tools,

Problems for teachers in integrating the 6C of 21st-century education into ESP classes

Concerning teachers' professional development, all teachers stated that they did not have any formal training specifically targeting all six competencies; still, they did a kind of self-instruction before teaching to enlarge their knowledge in the target subject area. They also insisted that they have a great desire to be trained because it improves the quality of teaching and learning. For instance: *T1* pointed out that:

> Unfortunately, I haven't had any training in 21st-century skills teaching. ESP teachers often prefer to work independently. I acquired the practices of the competencies through readings and workshops on integrating competencies into the engineering curricula. These sessions offered practical strategies for fostering critical thinking and problem-solving skills, which are central to my courses.

Another respondent highlighted the importance of training in the 6 Cs. *T4* explained that:

> In STEM contexts, the emphasis has always been more on digital literacy and problem-solving skills. I targeted training in these areas, particularly through industry partnerships and technology-focused workshops. However, I had to supplement this with my research to fully integrate the other competencies.

The reaction of the respondents implies that training in the 6 Cs is tremendously required because it familiarizes teachers with background knowledge about designing courses and choosing suitable teaching methods and materials. However, these answers suggest that 21st-century skills training in Morocco is almost absent and that ESP teachers have never attended any in-service training before they are engaged in the teaching of ESP courses. This is quite alarming as one wonders how it is possible to teach an engineering discipline without benefitting from any kind of training. The fact that ESP teachers lack training in ESP is concurrent with previous studies in various ESP contexts (Iswati & Triastuti, 2021; Akhjam, 2019).

One of the challenges that ESP teachers is students' demotivation, according to the participants, almost the majority of students are not motivated, maybe because they do not realize the worth of the 6 Cs. In this regard, four ESP teachers blamed their students for being unwilling to participate in classroom activities. Turner & Patrick (2004) highlighted that many factors encourage student unwillingness to take part in classroom activities, including teacher interaction strategies, lesson objectives, and the proficiency level of the students. Since actual classroom observations were not conducted to investigate the extent to which students are motivated, it would be difficult for the researcher to draw a general picture of the attitudes of the students. In this case, *T3* said that:

> Low student motivation impacts classroom activity. This results in some students being less engaged, less active, and less interested in participating in class activities. Additionally, some students show slower cognitive and learning responses. These factors undoubtedly hinder learning progress and the effective integration of the 6Cs.

Another significant challenge that was mentioned by some participants is balancing the technical content with the competencies. *T5* admitted that: "engineering courses often involve complex terminology and concepts, and it can be difficult to integrate 6 Cs like teamwork and problem-solving without overshadowing the core knowledge". In the same context, *P2* stated that "the technical rigor of engineering subjects can make it hard to incorporate the 6 Cs training effectively. For example, problem-solving and teamwork activities require time and resources that sometimes compete with the need to cover a vast amount of technical content".

The third challenge is teaching materials. As revealed by the participants, there is no pre-arranged syllabus or course book they can follow, and the ESP course content is not specified clearly. The choice and the development of teaching materials are completely left to the teachers. *P4* firmly believed that the current ESP course is unsatisfactory, and he put it as follows: "The thing is that the materials don't coordinate with the level of our students. We need a course prepared by the ministry itself, suited to the students of engineering". Consequently, ESP teachers are given the unreasonable burden of designing the syllabus and selecting teaching materials by themselves without the involvement of their institutions. Furthermore, the issue of cultural and contextual relevance was also indicated by one of the participants. *P1* claimed that « teaching materials may lack relevance to the specific cultural or contextual needs of students, especially in a diverse classroom setting ». To put it in another way, ensuring that teaching materials are culturally and contextually relevant is essential for engaging all students and fostering an inclusive learning

environment. When materials reflect the diverse backgrounds and experiences of students, it helps make the content more relatable and meaningful. This relevance can enhance student engagement, improve understanding, and facilitate better application of concepts to real-world situations.

Solutions expected by teachers in integrating the 6C of 21st-century education using AI tools

The researcher investigated the challenges faced by teachers in integrating the 6Cs and asked how they can overcome those challenges using AI tools. Teachers were asked whether they were familiar with the framework for inclusive AI learning design since it is considered to be crucial for increasing participation in AI careers, fostering diversity, and driving economic progress in related industries. *P4* said « Yes, I am acquainted with the framework for inclusive AI learning design and the 6 Cs. Each component plays a vital role in ensuring that AI tools are utilized in a way that ensures the fulfilment of individual learning styles and needs ». Another participant added « I try to incorporate the 6 Cs into my teaching by ensuring that the context of AI tools matches the learning goals and needs of my students, but I often face the problem of ensuring that all students, regardless of their background or technical skill level, can effectively engage with AI tools ». On the other hand, *P1* admitted that he is not well-versed in the 6 Cs framework. He also explained that his teaching approach is mainly about general English. He commented as follows: « I have not heard of the 6 Cs of inclusion before. My work with AI tools has generally been driven by the goal of enhancing the English language skills, rather than a structured framework for inclusivity ». It can be inferred from the above responses that the ESP teachers' styles of teaching may influence the students' perceptions of the importance of the 6 Cs and why they need them.

In the second section of the interview, the discussion centered on how AI tools can enhance the six key competencies in their courses (critical thinking, communication, collaboration, creativity, citizenship/culture, and character education/ connectivity). The first two participants highlighted the following AI tools (Duolingo, Babbel and Grammarly). They noted that students cannot often effectively convey complex technical information clearly and concisely. To address this problem, *P2* said:

> In my teaching, I use AI-powered language learning platforms such as Duolingo and Babbel that provide real-time feedback on students' writing and speaking tasks », whereas P1 added « I employ AI-driven writing assistants like Grammarly to assist students in refining their writings. These tools provide detailed feedback on clarity, coherence, and technical accuracy, allowing students to produce professional reports.

In addition, one of the participants highlighted the use of AI-driven collaboration tools like Microsoft Teams, Slack and Claude that facilitate group work and communication. These project management tools can help track progress and provide collaborative spaces for document sharing and real-time discussion. Furthermore, when asked about the competency of culture and citizenship, ESP teachers stated that students may not be fully aware of how cultural differences can impact communication and teamwork, leading to misunderstandings or ineffective collaboration. To address this issue, *P6* said:

> I sometimes assign students to write a reflective essay on their experiences integrating citizenship and cultural considerations into projects. I also require them to analyze their role in promoting ethical practices, respecting cultural diversity, and addressing societal impacts in their assignments.

All participants suggested that all ESP teachers need to choose flexible tools that align with their specific educational objectives, provide adequate support, and continuously assess the effectiveness of these tools. Moving on to critical thinking, *P3* described ChatGPT and Copy AI

as valuable AI tools that can generate complex scenarios and questions which could challenge students to analyze and evaluate various engineering problems.

Discussion

This study investigated the integration of the 6Cs (communication, collaboration, critical thinking, creativity, character education/ connectivity, and culture/ citizenship) in Moroccan higher education institutions using a framework for inclusive AI learning design. The study was shaped around three research questions: what is the perception of ESP teachers towards the inclusion of the 6 Cs in the curriculum? What is the perception of ESP teachers towards the teachability and assessment of the 6 Cs? and what are teachers' preferences among AI tools to facilitate the integration of the 6 Cs? The participants' answers to these questions and the discussion around these questions are as follows. The analysis of teachers' interviews and questionnaires showed that a successful ESP course relies heavily on analyzing and collecting learners' inclusive needs. Furthermore, the 6 Cs training for teachers proved to be essential in ESP instruction. All teachers shared the same idea concerning the prerequisite role of training because it enables them to bridge the gap between practice and theory. In other words, it allows them to adjust their attitudes and enhance their performance in the classroom e.g., teaching methodology, course content, etc. The shift from a General English teacher to an ESP practitioner requires training and cooperation with subject specialists in content choice and course design. For this reason, training embellishes the quality of teaching and learning English for Specific Purposes. These results support the findings of Touati (2023) and Sultanova (2021).

The respondents were also asked to indicate the degree of importance of the 6 Cs in affecting the success of prospective engineers in the workforce and provided their perceptions towards the teachability and assessment of those competencies. They suggested that higher education stakeholders should establish comprehensive strategies to integrate the 6Cs of 21st-century skills in Moroccan higher education institutions. Examples of such strategies may include the following: i) universities should encourage teaching-learning sessions where students are intensely expanding their own analytical and problem-solving skills as compared to only taking notes; ii) awareness campaigns should be purposefully launched to sensitize both students and ESP teachers on the importance of the 21st skills and consequently escalate their interest in teaching, learning, and acquiring the 6Cs; iii) the Model United Nations as a learning method is also recommended to train and measure students' problem-solving skills and communication skills. It is a type of simulation that emulates the procedures of the United Nations. It aims to offer a wide range of practical and educational opportunities in the areas of leadership, persuasion, negotiation, and consensus building. This model can play a significant role in giving students the chance to improve and practice the skills that have been recognized as desirable for the future workforce; iv) establishing a congruous learning environment that involves fostering a classroom culture that esteems divergent perspectives and promotes responsible citizenship by creating real-life work situations through project-based learning and active citizenship participation. Regarding the solutions, the findings indicated that AI tools like ChatGPT, Claude, Bard, and Copilot significantly enhance professional efficiency and offer various applications across various industries. Overall, the sample of interviews with the selected participants supports the questionnaire findings, emphasizing the challenges related to students' low motivation, difficulties in combining multiple competencies, limitations in teaching materials, and time management issues.

Conclusion

This study investigated the integration of the 6Cs (communication, collaboration, critical thinking, creativity, character education/ connectivity, and culture/ citizenship) in Moroccan higher education institutions using a framework for inclusive AI learning design. Findings showed that the integration of the 6Cs into education is a relatively new approach, and challenges are likely to arise in implementing these competencies in the classroom. It is hoped that teachers will find the solutions discussed in this study helpful for successfully incorporating the 6Cs into English-integrated skills. The research was conducted with a limited number of participants. Further studies in this area will reinforce and support the validity of the results of this research.

Funding: This research is not funded.
Acknowledgments: Not applicable.
Conflicts of Interest: The authors declare no conflict of interest.
Authenticity: This manuscript is an original work.
Artificial Intelligence Statement : AI and AI-assisted technologies were not used.

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Appendices

Appendix A

Table 2. *The integration frequency of the 6 Cs in the ESP curriculum*

6Cs	Frequency of Integration	Percentage
Communication		
Daily	11	73.3%
Weekly	4	26.7%
Collaboration		
Daily	8	53.3%
Weekly	6	40%
Never	1	6.7%
Critical thinking		
Daily	8	53.3%
Weekly	5	33.3%
Periodically	2	13.4%
Creativity		
Weekly	4	26.7%
Periodically	10	66.7%
Never	1	6.6%
Character education/ Connectivity		
Periodically	9	60%
Never	6	40%
Citizenship/ Culture		
Weekly	1	6.6%
Periodically	10	66.7%
Never	4	26.7%