University Changes in the 4.0 Educational Era: A Study into Moroccan Students' Interests

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Received: November 30, 2023 Accepted: January 6, 2023 Online Published: March 30, 2023

doi:10.5430/jct.v12n3p100 URL: https://doi.org/10.5430/jct.v12n3p100

Abstract

Faced with the challenges presented by the transition to Industry 4.0, deep and rapid transformation is required for higher education to meet the demands of the fourth industrial revolution. This article aims to investigate students' perceptions of various components of their academic ecosystem. our study is interested in examining the preferred teaching models, competencies, and fields of study that higher education should develop and national/international mobility. A questionnaire survey was conducted using a quantitative approach to collect students' perceptions; 97 students from Hassan 2 University participated in the study. The findings indicate that students are interested in blended learning, that they require programs to build their managerial and employability skills, that mobility is a fundamental element of education 4.0, and that its impact on employability development is recognized. The study enhances our understanding of higher education students' interactions within their university ecosystem. This study might be beneficial for policymakers and educational decision-makers in the transformation toward a university 4.0.

Keywords: education 4.0, higher education, industry 4.0 skills, student's perceptions

1. Introduction

In recent years, the labor market is undergoing major changes due to a global technological transformation known as the 4th industrial revolution. Industry 4.0 is mainly characterized by a shift from automated processes to smart processes which includes a set of technologies that combines real-time advanced technologies with high-level human skills (Mahiri et al., 2022). Cloud computing, the Internet of Things (IoT), artificial intelligence, data analytics, augmented reality, blockchain, and others are the trendy technologies granted to Industry 4.0 to enhance information and communication technology (ICT) and cyber-physical systems (Cevik Onar et al., 2018; Xu et al., 2018).

The education sector has been influenced by the Industrial Revolution 4.0. These changes in the labor market have posed major challenges for higher education institutions, and research centers (Miranda et al., 2021). A set of new skills known as 21st-century skills has been established to meet the new demands of the labor market.

Because Higher Education Institutions are a key source of qualified workers, their contribution to the development of innovation, technological advancement, and the transition to an industry 4.0 is critical. Higher Education is gradually shifting away from massification toward personalized and individualized learning environments to adapt to the fourth industrial revolution. The new Industry 4.0 technologies being integrated into higher education have a substantial impact on improving this learning environment.

2. Literature Review

Education 4.0 is defined as a new paradigm in which learning models are individualized, tailored to the learner's profiles, flexible in terms of time and place, and adaptive. In this new educational paradigm, the development of socio-cognitive, interpersonal, technical, and other abilities is given priority (Katyeudo & de Souza, 2022). The roles of teachers and students are altered by this new approach. While students must demonstrate more autonomy, teachers

must expand their role in offering digital and online support (Almeida & Simoes, 2019).

Many countries are altering their policies and plans to implement Education 4.0, particularly at higher levels. This has led to a rise in interest in Education 4.0 among many researchers. Investigations, particularly experimental ones, are being carried out to successfully leverage the potential of the technological trend and successfully integrate machine and human labor for educational purposes (Gueye & Exposito, 2020).

In this sense, the integration of Education and Information Technology in training and education is becoming increasingly important in the education 4.0 era. Using information and communication tools open teaching opportunities with a variety of learning combinations, for these, students show an interest in learning with ICT. Despite the effectiveness of online teaching methods, students still need to engage with teachers in person. Several studies demonstrate that blended learning, which combines online and face-to-face learning, produces more effective results than learning environments that exclusively use one of the two techniques, online or face-to-face learning (Kumalawati et al., 2021; Sudibjo et al., 2019). Blended learning is seen as a great alternative for higher education institutions, which explains the large number of institutions that have shifted to blended learning.

Our world is characterized by the rapid and borderless transit of people, products and services, information, and money (Ota, 2018). This globalized situation is becoming a defining feature of the Fourth Industrial Revolution. In this regard, educational policies are becoming increasingly interested in internationalization, which is seen as one of the key axes of Education 4.0 in higher education. It is about incorporating intercultural education into higher education processes. Having a mobility experience permits students to get 21st-century skills and has a favorable impact on their future career development (Karacsony et al., 2022). Funding programs are designed to foster mobility among higher education institutions around the world (Ota, 2018).

The digitalization of processes and Industry 4.0 technologies are causing significant changes in the labor market and society. Several human tasks have been automated and new work organization is required to make the industrial sector more efficient and productive (Rifqi et al., 2021). Future workers must not only adapt to new technologies but also develop cross-disciplinary competencies. Considering these circumstances, new skills are expected by prospective employees to fulfill their daily needs. Future graduates must be able to think critically about tasks, solve complex problems, communicate effectively, work in a team, and adapt to rapid changes in their context. It is widely known that while hard skills aid in job acquisition, soft skills are necessary for job retention and career fulfillment, soft skills are therefore a subject of study in various research (Succi & Canovi, 2020). There is evidence from several types of research that there is a mismatch between recruiters' expectations and the competencies students have obtained in Higher Education Institutes it is strongly recommended that soft skills programs be developed in collaboration between higher education institutions and companies.

Transversal skills, learning methods, and a variety of other concepts are key concepts of Education 4.0, they are a set of elements that provides an overall framework of Education 4.0. In this study, the researchers seek to answer three principal research questions:

1) What are the perceptions constructed by students on different course formats and certification platforms?

2) What skills do students believe are most important to learn in Higher Education, and what fields of study should be acquired at university?

3) Are students interested in mobility? for what reasons? what are the main barriers that limit their mobility?

3. Method

3.1 Study Design and Environment

This research uses a quantitative descriptive technique to explore how students perceive and are interested in pedagogical approach, mobility, and employment-related skills in the era of education 4.0. The survey was conducted between February and June 2022 in two higher education institutions: the Ben M'sik Faculty of Sciences and the National Higher School of Technical Education. The information was collected through a questionnaire.

3.2 Participants

Overall, 97 students participated in our study. The participants are enrolled for the academic year 2021–2022, and they come from the scientific (50 participants), technological (21 participants), economic, and literary (26 participants) disciplines. Participants ages range from 18 to 22 years old.

3.3 Data Collection Tools

The data collection tool is the questionnaire. It is divided into two parts, the first of which contains the respondent's personal data, such as age, institute, and field of study, and the second of which contains the eight research items. The data were collected using an online survey distributed through a google form.

3.4 Data Analysis

The study used research with a descriptive research design using a quantitative method. The tables and graphs have been processed with the programming language Python 3.10. this choice is justified by the wide range of graphs that python offers.

4. Results

The first question with which we began our questionnaire concerned the intention to return to university at a later stage in life; The majority of students gave a favorable opinion (92% answered yes, against 8% for no).

Table 1. Interest in National/International Mobility and the Ideal Duration

Interest of Mobility	Yes	No	one semester
National	68%	32%	47.62%
International	96%	4%	19.05%

Table 1 presents the interest of students in national and international mobility. According to the table, the majority of students show an interest in mobility for study, internship, or research purposes. students are more motivated by international mobility (98%) than national mobility (68%).

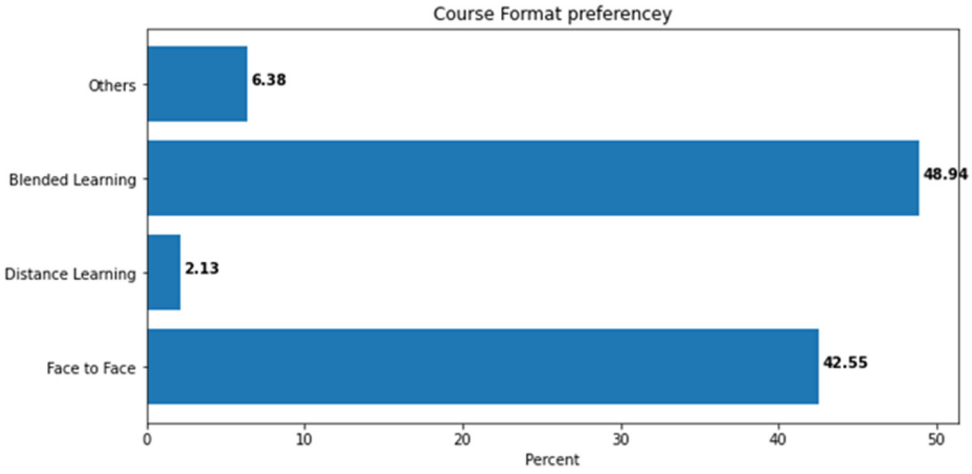

Figure 1. Course Format Favored by Students

Figure 1 argues that blended learning is the preferred format for 48,94% of students, followed by 42,55% who prefer face-to-face learning. A minority of 2,13% prefer distance learning.

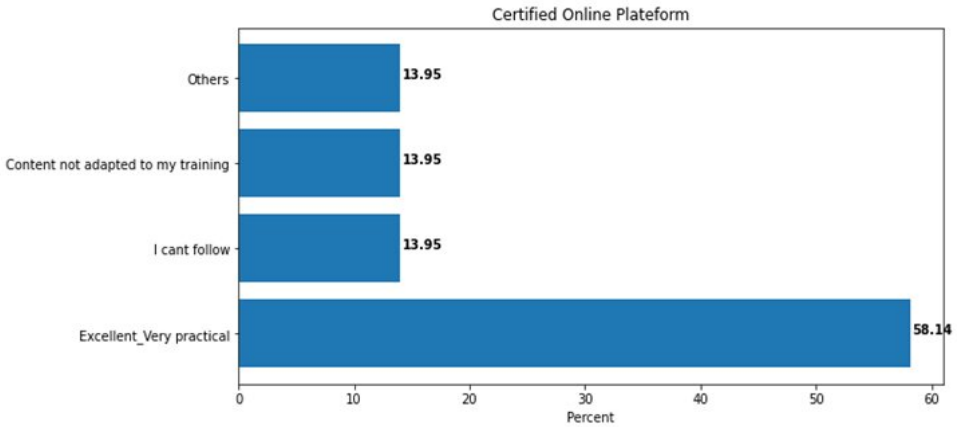

Figure 2. Students' Perception of Certified Online Platforms

According to Figure 2, 58,14 % of students consider online platforms an excellent/ Very practical solution for learning. 13,95% find that the content of online platforms is not adapted to their needs while 13,95 % have other reasons than those mentioned above.

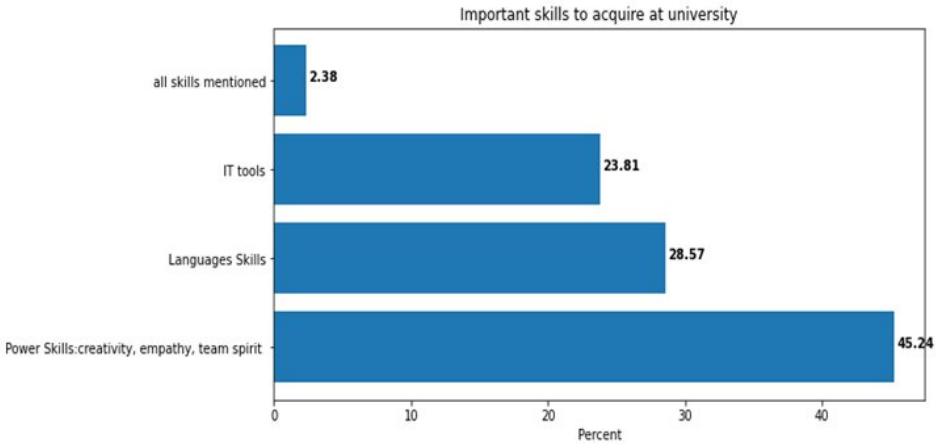

Figure 3. Important Skills to Acquire at University

45,24% of students want to learn power skills firstly, such as creativity, teamwork, and empathy. Languages are ranked second: 28,57% of respondents seeking to learn languages followed by 23,81% who want to learn IT tools (IoT, Big Data, Artificial Intelligent, and others).

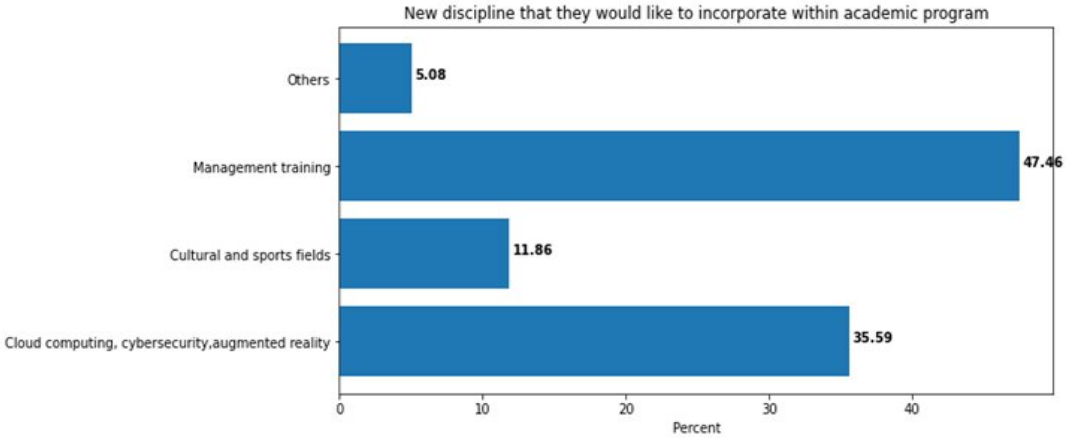

Figure 4. Important Fields of Study to be Integrated into the University

47,46% percent of students believe that management training should be included in academic programs, and 35,59% are interested in IT disciplines such as cloud computing, cybersecurity, augmented reality, and virtual reality. 11,86% consider that cultural and sports activities should be included.

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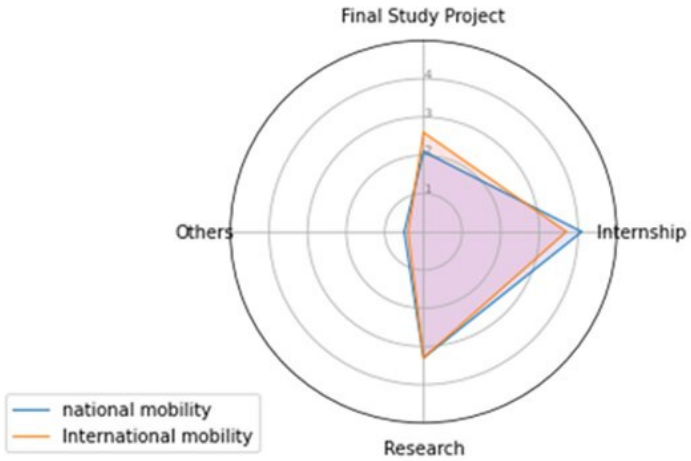

Figure 5. Ideal Purpose of Mobility

According to Table 1 and Figure 5, the majority of students are interested in mobility especially international mobility for a long period (96 percent prefer international mobility, with 81 percent opting for a one-year stay). According to our findings, students prefer to mobilize for an internship than for academic reasons, Final Study Project comes at the end of the list.

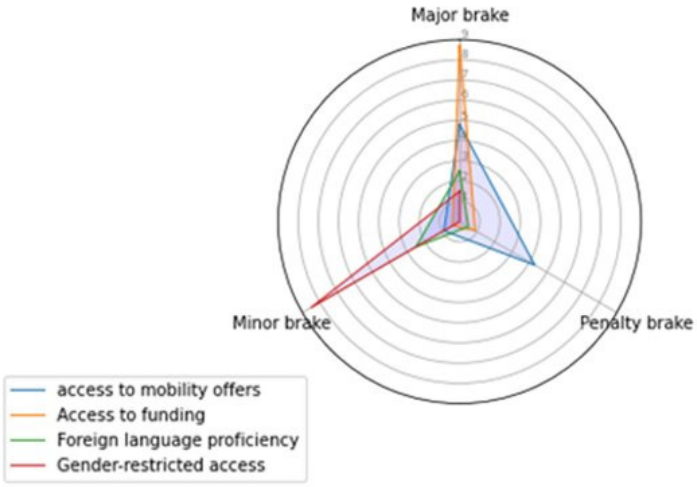

Figure 6. Barriers to National and International Mobility

Figure 6 shows the obstacles to mobility. Students consider access to funding to be a major obstacle to their national or international mobility, followed by access to mobility opportunities, which students split between a major obstacle (48%) and a penalty brake (43%). Language is a penalty brake for 50% of students and a major brake for 25%. Gender is a major brake for a small proportion (15%), and 85% consider it a minor brake.

4. Discussion

The fourth industrial revolution will bring about many developments and their related repercussions, including substantial alterations to society and education. Engineering education in higher education must be planned to be in line with market demands given the significant role that graduates from higher education play in the development of industry 4.0. Education 4.0 incorporates smart solutions such as cyber-physical exchange and analytic learning into the curriculum to improve learning. More and more learner-centered pedagogical methods are made possible by ITCS. The labor market's hyper-competitiveness requires industry to manufacture more efficiently, economically, and quickly, which has resulted in the automation of many human tasks. Employers' preferred skill set is evolving, with an emphasis on the soft and digital skills that characterize industry 4.0(Goel et al., 2020; Mourtzis et al., 2018a).

The goal of this study is to investigate the university context as it transitions to a university 4.0 environment. Our research focused on students' perceptions of elements considered to be core components of education4.0: Preferred study formats and certification platforms, skills acquired at university, and fields of study to be incorporated into curricula, interests, and limits of national/international mobility.

According to the survey results, students prefer blended learning over all other course formats, followed by traditional courses, and very few students are interested in online courses. Similarly, and by the same participants, certification platforms were perceived as an excellent practice for training. Studies carried out to confirm that online learning is undoubtedly included in higher education but online programs are still unable to satisfy students despite their growth, the positive experiences developed by learners in traditional courses reinforce this dissatisfaction. In online courses, engagement and social presence are difficult to achieve, which hurts online studying, particularly for students who have no prior experience with online classes or who are less confident in their ability to learn online. An online course's success is also influenced by the content taught the instructor's competence, and the technical infrastructure (Bali & Liu, 2018; Mourtzis et al., 2018b).

The blended learning model is a suitable intermediate solution that can bring together the advantages of both face-to-face and online learning, such as flexibility and teacher-student contact. Blended learning is now widely adopted by higher education institutions (Shamsuddin & Kaur, 2020), it allows for the use of various pedagogical techniques, synchronous and asynchronous interactions, and other teaching strategies to enable learner-centered learning (Heilporn et al., 2021).

It is important to investigate students' preferences and perceptions when pedagogical practices target active learning, thus, our second line of research focuses on examining students' perceptions of skills to be developed and fields of study to be acquired in higher education. The findings indicate that students are interested in learning soft skills including creativity, teamwork, empathy, and many more, languages come next, then IT skills. The gap between industry expectations and those of universities is one of the main factors limiting employment, inadequate industry-university partnership, and poorly managed internships (Kusmin et al., 2018). With the new technology emerging with industry 4.0, a highly skilled workforce is required to manage this advanced technology (Hernandez-de-Menendez et al., 2020). In a hyper-connected industry, soft skills are in high demand in addition to technical skills. Many studies recommend equipping future graduates with employability skills, particularly communication, critical thinking, teamwork, and problem-solving (Low et al., 2021; Potts, 2022).

In the era of Industry 4.0, student mobility is a trend that aids in the development of employability skills, particularly those that are in high demand in the job market: communication, teamwork, and problem-solving (Potts, 2022). Therefore, it is advised to set up exchange programs, particularly internships internationally, and to give the resources that the respondents believed to be the main obstacle to mobility.

5. Conclusion

In such a changing environment, the role of higher education becomes critical; changes toward university 4.0 affect not only pedagogies and teaching methods, but the transition to efficiency must affect the entire university ecosystem to be successful. In this study, we can see students' interest in various learning approaches, international mobility opportunities, and their involvement in gaining the skills needed in the industry 4.0 era.

To determine how prepared the various parts of the Moroccan university are to adopt the education 4.0 paradigm, more research must be conducted using a systematic approach. This will make it possible to suggest effective educational policies.

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