Higher Education Study Programs Orientation on the Applications of Artificial Intelligence

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Abstract

The development of science and technology in recent years, due to the requirements of different areas for the implementation of these technologies, has oriented higher education institutions at the international level, to adapt and focus on the educations of professionals and development of advanced technological skills and competencies [1]. These needs are particularly evident in the field of applied sciences and medicine, where great achievements have been recorded in recent years [2]. Meanwhile, in our country, although in many areas of life there are advances in the implementation of smart technologies and artificial intelligence [7], there is still a low level of professional training, advanced university education on the big data analysing, machine learning and artificial intelligence (AI). AI can provide a great support to learners through academic sustainability or discontinuation predictions [3]. Many examples show how it evolves and exerts its potential over time. By utilizing AI in education, we can increase its potential use of applications, its visualization, prognosis and prediction [6]. In our study we made a wide analysis of the AI contribution in different areas of applications and explore the present situation of how the higher education institutions (HEIs) in Albania are prepared and focused to provide various programs or courses in AI knowledge provision, learner evaluation, and learner counselling methods. Our findings highlight the expertise required for future study programs updating by HEIs in Albania in AI application in different fields. Regarding practical implications, this study addresses the topic of AI innovations affecting all life domains, relevance to applied sciences and medicine. Based on our research, we highlight the implications in the review of the content of the study programs, starting from the review of existing literature and also the updating the content with AI applications the study programs [12].

Keywords: *artificial intelligence, study programs, education, quality, curriculum design.*

INTRODUCTION

The Education System in Albania includes four levels of education: preschool education, basic education (primary & lower secondary), secondary education and higher education. Based on data obtained from Institute of Statistics (INSTAT) show [4], at the beginning of the 2021-22 school year, 83.8% of all children and students of school age were enrolled in education. However, the enrollment rate varies for different levels of education. Students of pre-university education have a continuous decrease in number, a decrease

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[4]http://www.instat.gov.al/al/statistika-zyrtare-femije-dhe-te-rinj/arsimi/raporti-neto-i-registrimene-ner-n%C3%AB-arsimin-parauniversitariat-gjat% C3%AB-an%C3%AB-academic-year/

which last year reached 13.2%, compared to students of pre-university education 2017-18. A decrease in the number of students is also observed in higher education, with 6.0% less, compared to the year 2017-18.

The structure of the education system has not undergone significant changes in recent years[5]. However, there has been a decrease in the number of educational institutions, especially in the rural areas of the country. Regarding the higher education system, it has undergone continuous changes. The higher education system includes[6]: Universities, Academies, University Colleges and Higher Professional Colleges. Institutions of higher education are legal entities that offer higher education or professional qualification after secondary education and, according to the type of institution, also scientific research, as part of the higher education system, created, and that exercise their activity in accordance with the legal and by-laws in force.
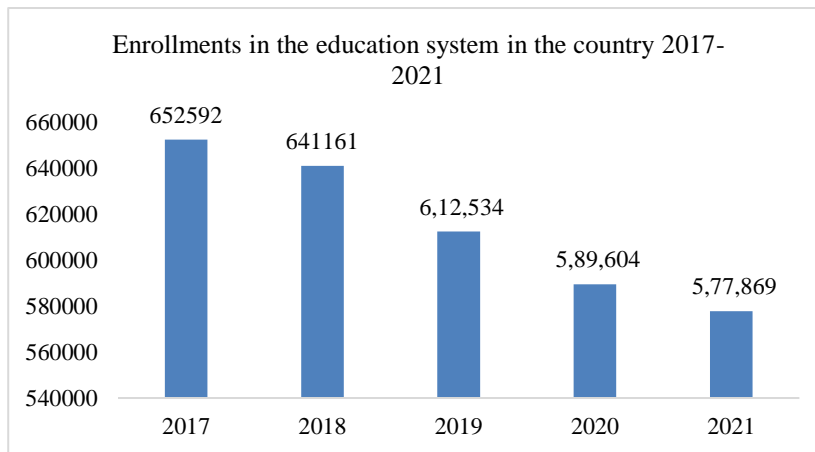

Figure 1. Enrollments in the education system in the country 2017-2021
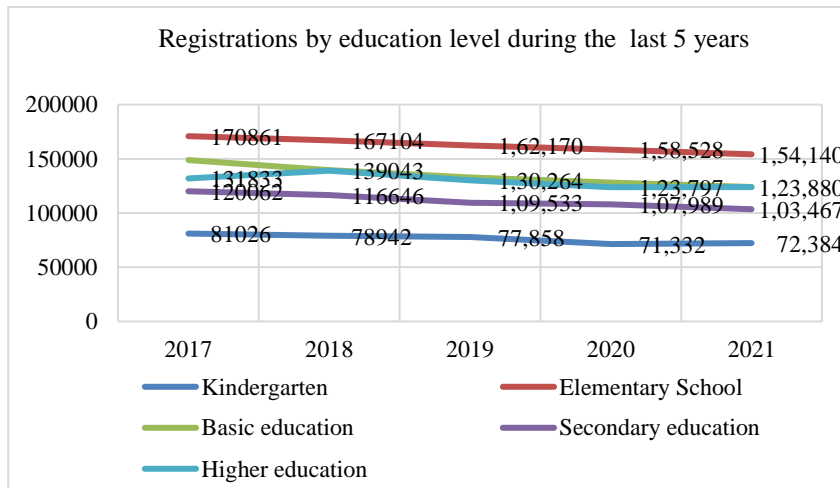

Figure 2. Registrations by education level during the last 5 years

In Albania, 42 institutions of higher education are active and operating, of which 15 are public and 27 are private[7]. In total, the number of study programs in all institutions and in all three study cycles is about 1350 programs (INSTAT). The number of students studying in these programs is about 123,800, marking a decrease in the last 5 years. If we look on

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[5] https://www.euroeducation.net/prof/albanco.htm

[6] https://www.ascal.al/media/documents/legjislacioni/Law%20no.%2080_2015.pdf

[7]

https://ascal.al/media/documents/publikime/Annual%20Report%20ASCAL%20and%20BA%2020 21.pdf

the programs oriented on the infermoation technology, at the national level, we have about 125 study programs of the first, second and third cycle are oriented in the field of Computer Science, Information Technology, Electronics, Informatics, etc. This includes the first cycle programs which belong to other fields but end with a diploma in teaching (informatics teacher for pre-university education). It should be noted that over the years the number of programs has been greater, which means that the number of graduates is greater. Some programs have been closed or reorganized based on the requirements of the new law on higher education. Due to non-unified designations according to International Standard Classification of Education (ISCED)[8], there may be other programs with a similar profile to the field under study. If we look on the programs with clear oeirntation on artificial intelligence and its applications, we have only three programs. this number is quite low in reference to the total number of information technology programs and the needs of the current labor market. Universities have the academic freedom to develop and orient their programs in accordance with the needs of development and the labor market. the drafting or reorganization is carried out in accordance with the current legal framework in force, which guides the institutions in adapting the content of the programs.
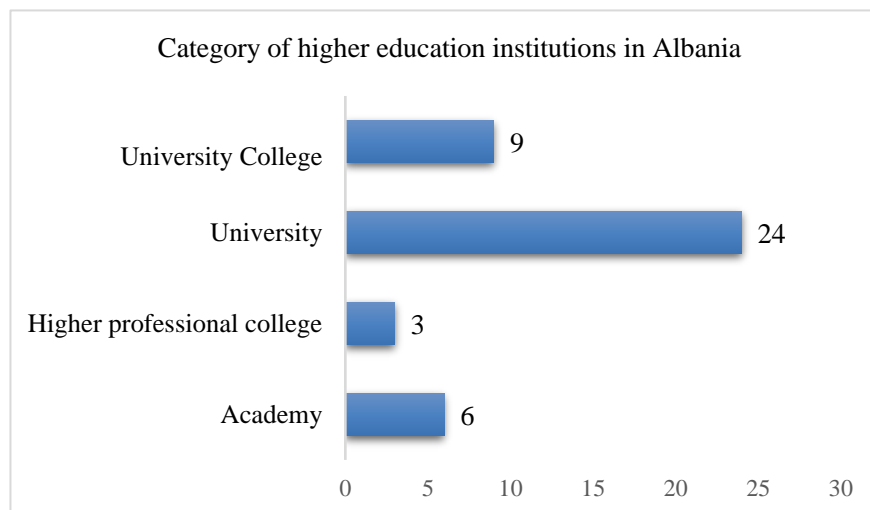

Figure 3. Category of higher education institutions in Albania

To fulfil the requirements of Law 80/2015[9] "*For higher education…*" a higher education institution in Albania, should provide a degree/professional qualification/ diploma or a recognized certification based on ECTS. Completion of studies is accompanied by a graduation, diploma, and diploma supplement. The program content, structure and relevant credits are in accordance with HEL, Quality Code, European Quality standards and Guidelines, AQF/EQF (Albanian / European Qualification Framework), and internal documents and policies. Generally, 1 ECTS is equivalent to 25 hours of learning to be used for a study program. The number of hours allocated to contact hours, self-study, hands-on practice, research, internship, and assessment, is different for different subjects of the program. Reports between teaching activities for a module (in hours) are based on the time needed for that knowledge to be acquired in accordance with the objectives of the master's program (usually determined by experts/academic staff involved in the study program).

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[8] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_(ISCED)

[9] https://www.ascal.al/media/documents/legjislacioni/Law%20no.%2080_2015.pdf
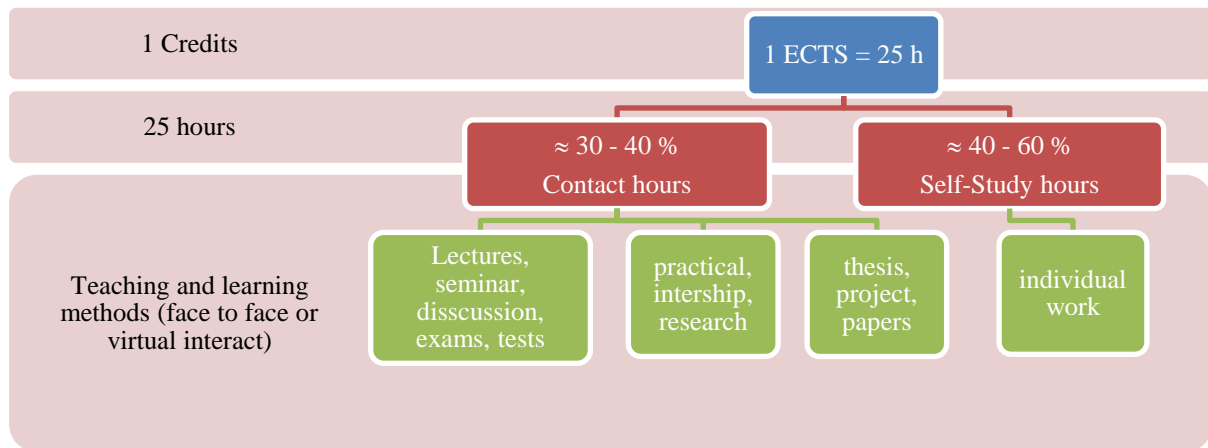
Figure 4. Relationship between ECTS and teaching hours

The program design and development of the curriculum of the program is essentially based on the credit system concept and is performed by HEIs itself. It is a complex process to design and develop a program/ curriculum based on European Credit Transfer and Accumulation System (ECTS)[10]. There are a set of steps that must be analysed and presented together. Moreover, the curriculum is analogous both for the acquisition and improvement of qualifications. At the institutional level, each institution should have a program design methodology that includes the main principles of curriculum drafting and gives explanations of the specific steps of the process. The structure and content of the program should meet formal institutional, national, and international requirements, legal basis, standards, and other quality indicators. The structure of the program should be based on a logical relationship between its elements: study subjects or modules correspond to study outcomes and objectives; the sequence of study subjects is coherent, valid, and based on clear principles of curriculum design and development; the length of the program and modules or subjects is optimal to achieve education and training outcomes; etc. The content of the program should reflect the novelties in education and training for 7 level of EQF. The content should be up to date with the latest knowledge, research results, actualities in the field and examples of various practices. The study program should provide the application of appropriate study methods and forms. They should correspond both to study outcomes and the content of the courses as well as allow reveal and develop individual abilities of students. The content of the program should take into consideration the available resources needed which should be sufficient and appropriate for the program content realization.

METHODOLOGY AND RESULTS

Our research group in collaboration with partners of health sector in Albania and abroad, started a project to carry out advanced studies in the development and use of new technologies in the field of medical imaging. The project "*Development of simulation and forecasting models and integration with the TCIA database of medical images*", is financed by the National Agency of Scientific Research and Innovation in Albania (NASRI) and supported by Albmedtech, EFOMP etc.

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[10] https://education.ec.europa.eu/education-levels/higher-education/inclusive-and-connected-higher-education/european-credit-transfer-and-accumulation-system#:~:text=The%20European%20Credit%20Transfer%20and%20Accumulation%20System%20(ECTS)%20is%20a,and%20study%20periods%20abroad%20recognised.

(AI4MED[11], 2023) [12]. The main objective of our research was studying the level of use of artificial intelligence in medicine with special focus the diagnostic system in Albania. We analyzed the actual situation by collecting information from the public and private sectors about new technologies and AI applications etc. At the end we evaluated the level of advanced technology use, the knowledge and the needs. We collected data about the level of education/training of personnel working in diagnostic centers. A form distributed to professionals of medicine in various hospital centers. In this form, first of all, the following were required: General information and some data related to his contacts, - Information on your use of advanced technology, automation and artificial intelligence, Information about centralized systems of administration, management, Use of advanced information technology programs related to diagnostic imaging, simulation, AI and decision-making support.

Figure 5. Interface of survey, distributed for professionals of medicine

The form was open and addressed only to the professionals already employed in a medical center or have had similar employment experience. In our evaluation methodology we focused on gathering information in two phases. In 2022 we performed the first phase of the study where we collected general information and statistics data of diagnostics medical devices in public and private sector. The data collection phase with site visits and surveys. In 2023, we continued with second phase of the project by evaluating the level of using of new technologies and AI in medicine, (actual situation data collection with site visits and surveys). The form was filled out by about 365 professionals for whom some preliminary analyzes of the declared results were also carried out. Likewise, the level of familiarity of technicians with AI programs and applications is almost lukewarm or non-existent. By evaluating the knowledges, skills and competences of professionals of medicine on automatizations and optimization, AI applications, we found that the actual situation needs improvements. To have a clear picture about study programs in other areas of study, we analysed the content of different programs, offered by University of Tirana[12] and Polytechnique University of Tirana[13]. There are some examples of use in the literature, however many subjects of programs are not drafted with focused on AI applications as many studies on AI simulation-based learning propose [4], [5], [8], [10]. The most thematic trends that we were identified are:

- *Methods:* (Conceptual or architecture design, Experiments, Systematic literature review or meta-analysis, Usability or evaluation study, Machine learning validation,

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[11] https://ai4med.net/

[12] https://unitir.edu.al

[13] https://upt.edu.al

Qualitative (case study or interpretive study), Conceptual or architecture design, Experiments, Systematic literature review or meta-analysis, Usability or evaluation study, Machine learning validation, Qualitative (case study or interpretive study)

- *Mixed-methods design,* (Machine learning algorithms or ensemble methods, Module-based modelling, Hybrid mechanisms, text-to-speech /conversion technology, Rule-based AI, AI markup language, Scripted AI, Affective computing, Multimodal technologies, AI in general without technical details)

- *AI technologies simulation/ learning outcomes* (Intelligent tutoring systems, Virtual/mixed reality, Simulation games, medical simulation, Smart edutainment)

- *Research issues and contributions (*Cognitive theory of multimedia learning, Motivation theories on learning, social learning and social constructivism, Self-regulated learning, Situated cognition, Social cognitive theory, Collaborative learning).

Other identifications have the focus on technologies used to implement AI, machine learning, deep learning, natural language processing, expert system, image/speech recognition, virtual reality etc [13], [14], [15].

RECOMMENDATIONS

In this paper, we presented findings and results of our study on the orientation of study programs in AI application related with the field of study programs. The results as we mentioned, are low so the graduate and employed students, represent the needs that they have to develop more skills and competences in different areas of AI applications. In this context, we recommend the following activities with the aim of preparing programs for the new needs of the current or tomorrow's market.

Firstly, we propose curriculum revision and updating the syllabus with new AI developments and applications. This can help students understand the potential benefits and challenges associated with AI. This can also provide guidance on the appropriate use of generative AI, emphasize the importance of academic integrity, and use AI syllabus generators to simplify syllabus creation. After that, we recommend to update the study programs with AI applications where the higher educational institutions should consider incorporating AI-powered systems for personalized and adaptive learning, gamification, automated grading, and lesson planning. Best practice suggests to use AI for learning analytics, assistive technology, automatic content analysis, image analytics, plagiarism detection, chatbots for enrolment and retention, transcription of faculty lectures, enhanced online discussion boards, analysing student success metrics, and academic research. However, it is important to consider the potential risks and challenges associated with AI, such as the potential for bias and discrimination in AI algorithms, and the risk of widening achievement gaps if AI adapts by speeding up the curricular pace for some students and slowing it down for others**.** Therefore, it is important to establish interdisciplinary research focus to examine the social, ethical, and pedagogical challenges associated with AI. We strongly suggest that HEIs in Albania before starting curriculum reorganization or design, should have a close cooperation with labor market to have a better view on needs and how can reflect them into study program. In our example, we showed that the professionals of medicine have low of skills and competences on what AI can provide and how these benefits can be applied.

ACKNOWLEDGEMENTS

integration with the TCIA database of medical images". The authors would like to thank also READ (Research Expertise from Academic Diaspora), Albmedtech, AAMP, EFOMP.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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