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EMPLOYABILITY OF MATHEMATICS, STATISTICS, AND COMPUTER SCIENCE GRADUATES: INTRODUCTION TO SKILL COURSES

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Abstract. The purpose of this article is to investigate job opportunities for graduates of mathematics, statistics and computer science. By introducing skill courses related to these fields, suggestions are made to improve the employment status of graduates. These proposals provide the opportunity for students to increase their preparation for entering the labor market by acquiring some technical and specialized skills appropriate to their field. These skills can be a valuable advantage for graduates in the labor market. Moreover, learning such skills can pave the way for nurturing their creativity and entrepreneurial opportunities.

1. Introduction

Over the past century, universities have evolved significantly, changing from traditional teaching and research-focused approaches to specialized centers that address modern societal needs. This evolution categorizes universities into four generations.

The first generation universities, founded in the early 19th century, focused mainly on education and dissemination of knowledge. In Iran, this approach was prevalent until the 1980s and emphasized on training students for teaching, higher education or managerial positions [1].

The second-generation universities, which are called research-oriented, expanded to basic research in addition to education. Iran started promoting university research in 1987 and strengthened scientific research and international competition among faculty members [2].

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Third generation universities prioritize skill development and entrepreneurship along with education and research. The Ministry of Science in Iran encourages universities to adopt this model by emphasizing the quality of internships, skill development and entrepreneurship courses.

The fourth generation universities, which are common worldwide, not only teach and research, but also shape the future of society. These universities guide the political, economic and social paths and their goal is the worthy position of a country in the international system.

In the evaluation of mathematics, statistics and computer science fields in the framework of third generation universities, official statistics indicate a high unemployment rate among the graduates of these fields in Iran. Challenges include insufficient attention to basic skills in curricula and the preparation of graduates for the labor market. Despite the theoretical nature of these courses, graduates have the potential to develop skills and entrepreneurship. For example, mathematics and statistics graduates can contribute to fields such as data analysis, artificial intelligence and finance.

In this article, we examine the status of mathematics, statistics and computer science fields in third generation universities. Official statistics indicate that these fields have the highest unemployment rate among graduates. According to the data, computer graduates have an unemployment rate of 33.1 percent and mathematics and statistics graduates have a 15.4 percent unemployment rate [3]. This indicates important challenges in the labor market for graduates of these fields. Some of these challenges are related to the country's economic situation and its continuous development, which needs further investigation and is not the main focus of this article. According to the author, a significant part of these challenges is due to the nature of the disciplines and insufficient attention to basic skills in the curriculum and course list.

2. **Main Results**

Universities have evolved to address contemporary societal needs, focusing on skill enhancement, entrepreneurship, and social impact alongside traditional teaching and research missions. Addressing challenges in fields such as mathematics, statistics, and computer science requires a concerted effort to improve curriculum alignment with labor market demands and strengthen entrepreneurial skills among graduates.

The top universities in the world have programs for the development of entrepreneurship. For example: Stanford University has been promoting entrepreneurship since 1996 by offering the "Stanford Entrepreneurship" plan and implementing educational programs, entrepreneurial spaces and business consulting. Graduates of this university have founded successful ventures such as Google, Confluent, Yahoo and Instagram. Similarly, Babson College and Harvard University offer diverse entrepreneurship programs, nurturing startups and providing students with practical skills and resources. Known for its innovation, MIT supports entrepreneurship through its Entrepreneurship Center, offering workshops, one-on-one mentoring and the MIT Sandbox Innovation Fund, empowering students to develop their own ventures. Despite its global achievements, Iran faces high unemployment among math and computer graduates due to economic and social factors, which highlights the importance of developing practical skills.

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In recent years, the importance of training skilled students has been noticed in Iranian universities [4]. Some universities have implemented various programs to improve students' skills with the aim of increasing job opportunities. Shifting the focus from education and research to skill development plays an important role in making universities more attractive to students, strengthening industry-society relations, and increasing entrepreneurial skills. Universities need comprehensive entrepreneurship and employability programs to optimize their performance. It includes optimization of internal components such as staff, organizational structure, facilities, processes, and faculty members, and also equips students with the necessary personal qualities and entrepreneurial spirit, such as creativity, self-esteem, motivation, and internal locus of control. Fortunately, some Iranian universities have started implementing entrepreneurship programs to increase the employment of graduates [5].

The Technical and Vocational Organization of the country organizes numerous courses nationwide, offering standardized educational codes. Participants can receive internationally recognized certifications upon course completion. Recently, joint centers have been established within or near universities and higher education centers, aiming to support entrepreneurship, and technology development, and bridge the gap between academia and industry. These centers typically involve teams of researchers, technical experts, and active entrepreneurs, providing students with access to vocational courses. Unfortunately, mathematics, statistics, and computer science curricula lack emphasis on skill-building and employability courses. Utilizing elective courses and establishing skill-based programs in joint university centers could address this gap. Some proposed courses include:

1. International Financial Market Analyst.
2. Stock Exchange Trader.
3. Capital Market Principles Identification.
4. Securities Exchange Analyst.
5. Fundamental Analyst.
6. Technical Analysis of the Stock Market.
7. Digital Currency Trading.
8. Digital Currency Mining.
9. Insurance Sales Representative.
10. Insurance Market Researcher.
11. Government Accounting.
12. Audit Manager.
13. Data Center Design and Implementation.
14. Training Manager.
15. Literacy Coach Levels 1 to 3.
16. Educational Counseling and Guidance.
17. Educational Standardization Author.
18. Rapid Mental Calculation Training Specialist.
19. School Establishment Consultation.

20. Blockchain Programming.
21. Website Analysis with Google Analytics.
22. Business Data Smartization with Tableau.

One of the main reasons for students not choosing mathematics is the lack of job opportunities after graduation. Unlike some fields with bright career prospects, mathematics often offers fewer opportunities. This discourages students from pursuing math-related careers. However, offering advanced courses can generate interest and hope among math, statistics, and computer science students. Mathematics graduates face challenges in employment exams, where they often do not have the opportunity to compete. Providing support and attention from relevant organizations can help solve this problem. Mathematics graduates with proper training during their studies can participate in the recruitment tests of various institutions.

3. Conclusions

The curriculum for students in mathematics, statistics, and computer science generally emphasizes theoretical concepts with less focus on practical skills. While the nature of these fields is often defined solely by education, the country's employment situation and the large number of unemployed graduates in these fields require curriculum planners to focus on skill development while maintaining the nature of the field. Skills-based education is not a new concept, and research shows that the world's top universities have long emphasized entrepreneurship and skill development among students, and examples can be found in the fields of mathematics, statistics, and computer science. This article provides suggestions for skill development that will allow students to acquire the necessary skills and gain a competitive advantage.

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