A Proposed Framework for Using Adaptive E-Learning in Higher Education for Enhancing Education Quality and Contribute to Achieving the Sustainable Development Goals in Egypt

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Abstract: The integration of adaptive e-learning technologies in higher education has emerged as a pivotal strategy for enhancing educational quality in many countries of the world, this approach is particularly significant in addressing various educational challenges while aligning with the Sustainable Development Goals (SDGs). Adaptive e-learning represents a transformative approach in higher education. By personalizing educational experiences, adaptive e-learning has the potential to significantly enhance education quality and contribute to Achieving the Sustainable Development Goals (SDGs). This research paper aims to provide that, fundamental concepts, recent and personal thoughts and information about the adaptive E- learning and applications in Higher education, the Sustainable Development Goals 2030, and also a presentation of the Egyptian ministry of higher education and Scientific Research's 2030 strategy and a proposed framework for using adaptive E- learning in Higher education for enhancing education quality to contribute achieving the Sustainable Development Goals. This proposed framework is a bunch of seven steps. (Preparing standardized tests for each program and specialization to graduates, Stakeholder Participation, Training stakeholders on this model, Availability and Requirement, preparing supplementary programs in case of failure, Measuring the graduate quality and Update and modify the model on a sustainable basis). Through the seven basic steps, we will be able to enhance quality education in Egypt, prepare graduates who meet the needs of the labor market, and contribute in achieving four Goals of Sustainable Development Goals. Which are:(Quality Education "SDG 4", Gender Equality "SDG 5", Decent Work and Economic Growth (SDG 8) and Partnerships for the Goals "SDG 17").

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I. INTRODUCTION

The rapid advancement of technology has been transformed the landscape of education particularly in higher education institutions. Adaptive e-learning has emerged as a powerful tool for enhancing educational quality In Egypt through utilize intelligent systems to tailor educational experiences to individual student needs.

After an historic United Nations "UN" Summit in 2015, attended by 193 countries. The 2030 agenda for Sustainable Development Goals (SDGs) was been adopted

that include 17 SDGs. The SDGs comprise a new broad range of economic, social and environmental goals that universally applied on all, the governments work on achieving this Goals.

The Egyptian Ministry of Higher Education and Scientific Research has a national strategic plan in education and scientific research accordant Egypt's Vision 2030 based on the comprehensive state plan "Egypt 2030" that aims to achieve a comprehensive vision across various development areas. It relies primarily on studies of Egypt's comprehensive development plan and its relationship to the Sustainable Development Goals and various areas of economic growth, with the goal of maximizing the role of the Ministry's various institutions in supporting development across various economic, social, urban, and environmental sectors. by defining the sustainable development goals and the concepts of the fourth generation of universities and the economic activities of Egypt's regions.

II. RESEARCH BACKGROUND

➢ *Adaptive E- Learning: -*

The term electronic learning "E-learning", was first used in 1999 by Elliott Maisie referred to the use of electronic devices and resources in education. Since that, the term has been evolved significantly. but today E-learning refers to the process of using digital resources to provide learning and training. (1)

E-learning is the process of providing education and training through internet connectivity and through other types of technologies that can be used in collecting, storing, and distributing knowledge. E-learning is commonly called "online learning" or "electronic learning" because it mainly use internet connectivity in work, it makes it easier for students to learn at anytime and anywhere. (2)

Adaptive learning is an important aspect in many fields. It refers to an educational method that delivers personalized educational interventions, typically implemented through computerized algorithms that output personalized action recommendations based on analysis of the learning histories of the learners. (3)

Adaptive learning systems offer personalized learning experience to students' characteristics and abilities. Previous Studies showed that these systems could be effective learning tools. (4)

Adaptive E-learning is the adaptive learning method in E-learning that involve using course content easily adapted and modified for individual students. This method of teaching is outcome-based and focused more on the individual student's abilities and goals, this makes adaptive education more individualized and student-centric. Additionally, AI integration boosted the effectiveness of adaptive learning as it can easily personalize the learning environment for individual students, AI-based tools help in effective knowledge management which is essential for efficient adaptive learning. (5)

➢ *The Sustainable Development Goals (SDGs):*

On September 2015, at an historic UN Summit and in the presence of 193 countries. The 2030 agenda SDGs was been adopted; that include 17 SDGs (as shown in Figure 1) and 169 targets.

The SDGs comprise a new broad range of economic, social and environmental(as shown in Fig *2* Classification by domains- below) objectives that universally apply to all, and over the next fifteen years countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change while ensuring that no one is left behind. (6)
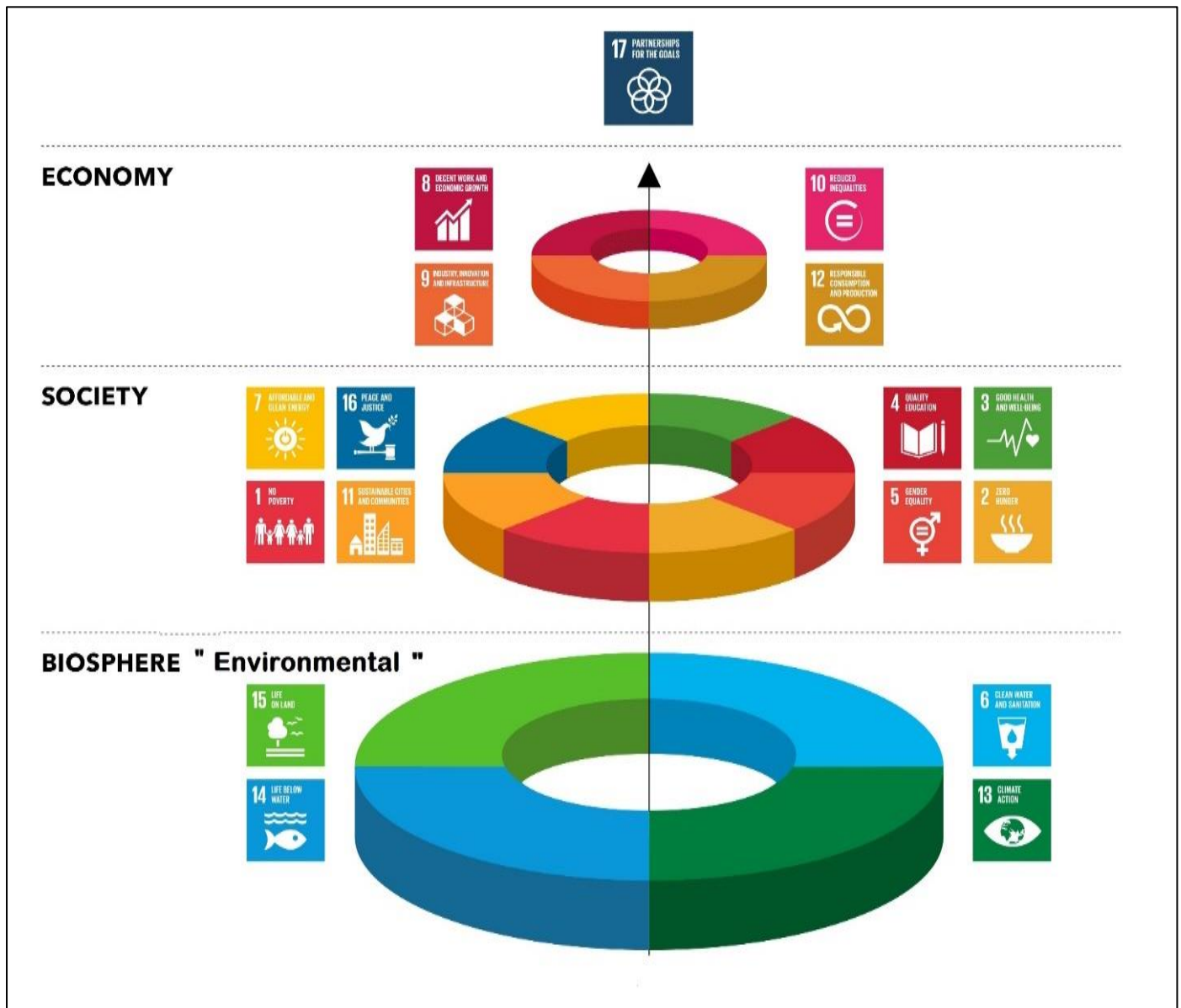

Fig 1 Sustainable Development Goals

Fig 2 Classification by domains
Source: Stockholm Resilience Center - Stockholm University (7)

> *The Higher Education in Egypt:*

The Higher Education in Egypt is under the supervision of The Ministry of Higher Education and Scientific Research which considered one of the state institutions concerned with building scientific and human characters of a broad spectrum of young people across universities and higher institutes.

The Egyptian Ministry of Higher Education and Scientific Research has a national strategic plan in education and scientific research accordant Egypt's Vision 2030 based on the comprehensive state plan "Egypt 2030" that aims to achieve a comprehensive vision across various development areas. It relies primarily on studies of Egypt's comprehensive development plan and its relationship to the Sustainable Development Goals and various areas of economic growth, with the goal of maximizing the role of the Ministry's various institutions in supporting development across various economic, social, urban, and environmental sectors. by defining the sustainable development goals and the concepts of the fourth generation of universities and the economic activities of Egypt's regions. (8)

By defining the sustainable development goals of the fourth-generation universities, the seven principles of "integration, interdisciplinary studies, communication, effective participation, sustainability, international reference, leadership, and innovation" can be developed. through which we can achieve the fourth-generation universities and thus achieve Egypt's Vision 2030. The Ministry of Higher Education and Scientific Research's vision is based on the comprehensive state plan "Egypt 2030," which aims to achieve a comprehensive vision for Egypt across various development areas. (9)

Fig 3 The Egyptian Ministry of Higher Education and Scientific Research has a national strategic plan
Source: Egypt's National Strategy for Higher Education and Scientific Research.

III. RESEARCH LIMITATION

As the scope of this research is Adaptive E-Learning and SDGs in Egypt. So, the limit of the research is all educational institutes subjected to the supervision of the Ministry of Higher Education and Scientific Research in Egypt.

IV. RESEARCH METHODOLOGY

As the scope of this research is Adaptive E-Learning and SDGs in Egypt. The adaptive e-learning represents a transformative approach in higher education. Adaptive e-learning has the potential to enhance education quality and contribute to achieving Sustainable Development Goals (SDGs) by adopting the methodology of the proposed framework of the Ministry of Higher Education and Scientific Research that contains seven basic steps: (Preparing standardized tests for each program and specialization to graduates ,Stakeholder Participation, Training stakeholders on this model, Availability and Requirement, Preparing supplementary programs in case of failure, Measuring the graduate quality and Update and modify the model on a sustainable basis).(as shown in figure 4).
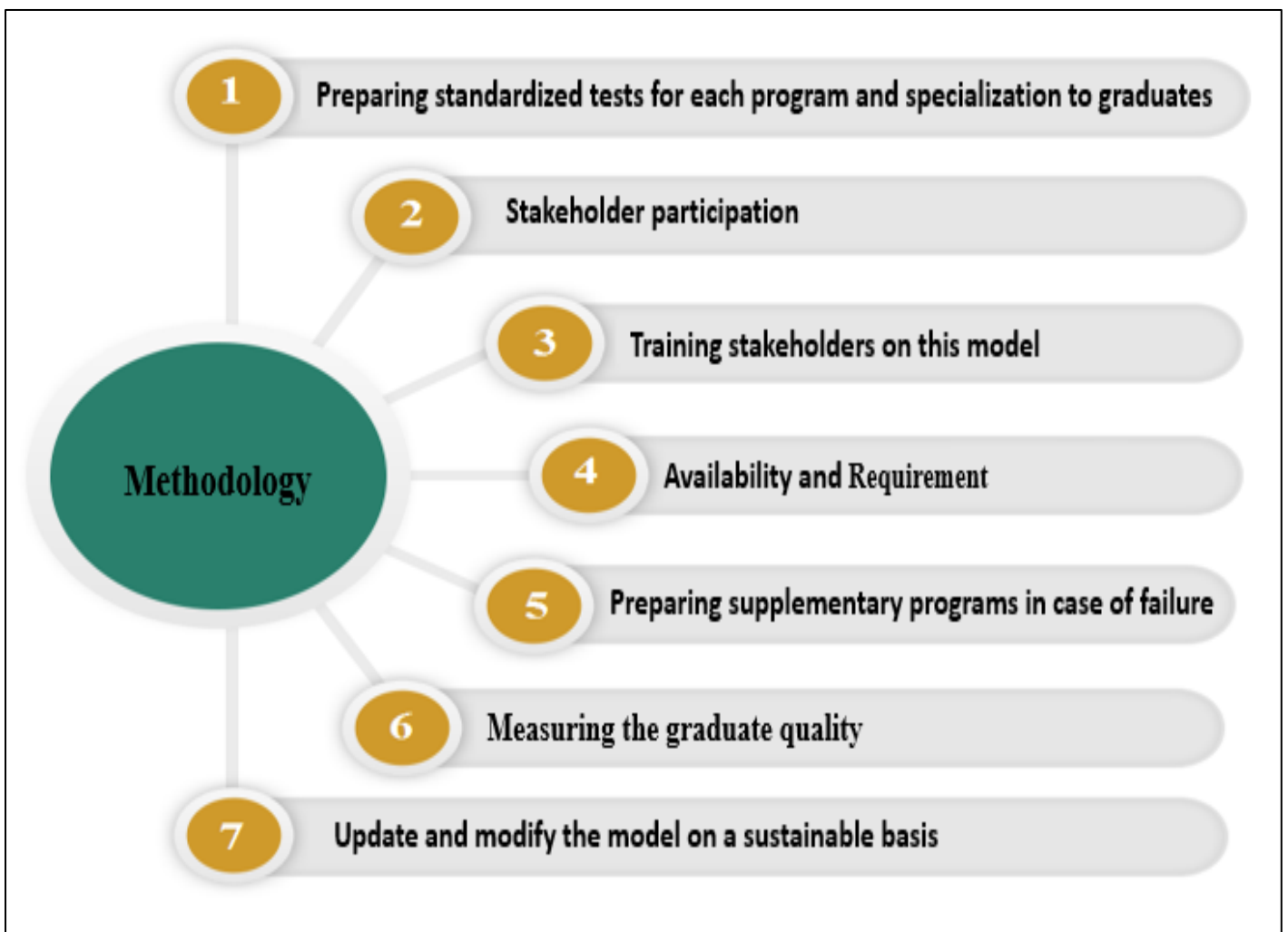

Fig 4 Research Methodology

➤ *Preparing Standardized Tests for each Program and Specialization to Graduates.*

The Ministry of Higher Education and Scientific Research prepares standardized tests for each program or specialization, through which it measures the graduate's suitability for the program or specialization's specifications.

➤ *Stakeholder Participation.*

The Ministry of Higher Education and Scientific Research shares the specifications and requirements of the tests for each program or specialization with participating parties (higher education institutions, employers, and other relevant bodies or organizations) to benefit from their feedback and comments.

➤ *Training Stakeholders on this Model.*

The Ministry of Higher Education and Scientific Research develops training plans for stakeholders on this model.

➤ *Availability and Requirement.*

The Ministry of Higher Education and Scientific Research provides passing tests for programs and specializations and requires educational institutions to complete them as a graduation requirement for students with higher qualifications.

➤ *Preparing Supplementary Programs in case of Failure.*

Requiring higher education institutions to develop supplementary programs if a student fails the exam.

➤ *Measuring the Graduate Quality.*

The Ministry of Higher Education and Scientific Research prepares the necessary questionnaires and opinion polls to measure the graduate quality and labor market requirements.

➤ *Update and Modify the model on a Sustainable Basis.*

Working continuously on update and modify the test models.

V. DISCUSSION

Adaptive e-learning represents a transformative approach in higher education by personalizing educational experiences. and also has the potential to enhance education quality and contribute to the achievement of Sustainable Development Goals (SDGs).

➤ *Mechanisms of Adaptive E-Learning to Enhance Education Quality: -*

Adaptive e-learning systems employ advanced technologies, such as artificial intelligence and data analysis to tailor educational content according to individual student needs through special tests for each program done by the Ministry of Higher Education and Scientific Research, that be achieved through:

• Diagnostic Assessments: Preparing standardized tests for each program and specialization to graduates, Stakeholder Participation, Training stakeholders on this model and Availability and Requirement.
• Customized Learning Paths: Preparing supplementary programs in case of failure. "Requiring higher education institutions to develop supplementary programs if a student fails the exam".
• Real-Time Analytics: Measuring the graduate quality and continuously updating and modifying the model "prepares the necessary questionnaires and opinion polls to measure the graduate quality, labor market requirements and Working to Update and modify the model on a sustainable basis ".

➤ *Contribution to Sustainable Development Goals: -*

The integration of adaptive e-learning in higher education aligns with and supports multiple SDGs:

• Quality Education (SDG 4): Educational outcomes will by improved through personalized learning. adaptive e-learning directly addresses the targets set for quality education.
• Gender Equality (SDG 5): Enhanced access to resources empowers women and marginalized groups and promote gender equity in education.
• Decent Work and Economic Growth (SDG 8): By equipping students with relevant skills and knowledge, the adaptive e-learning prepares them for the job market, fostering economic development.
• Partnerships For the Goals (SDG 17): By establishing partnerships between stakeholders such as the Ministry of Higher Education and Scientific Research, higher education institutions and business owners. "The Sustainable Development Goals can only be achieved through a strong commitment to partnership and cooperation to ensure that no one is left behind in our development journey".

VI. CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

The proposed framework presents an implementation of adaptive e-learning in higher education to enhance education quality and contribute to achieving Sustainable Development Goals in Egypt by addressing learning needs and fostering inclusivity. adaptive e-learning not only improves educational outcomes but also promotes broader social and economic development. Collaborative efforts among stakeholders are crucial to overcome challenges and fully realizing the potential of this innovative educational approach.

Through application of this methodology, which contains seven basic steps : (Preparing standardized tests for each program and specialization to graduates, Stakeholder Participation, Training stakeholders on this model, Availability and Requirement, preparing supplementary programs in case of failure, Measuring the graduate quality and Update and modify the model on a sustainable basis), We will be able to achieve quality education in Egypt and prepare graduates who meet the needs of the labor market, and also contribute to achieving four Sustainable

Development Goals Which are:(Quality Education (SDG 4), Gender Equality (SDG 5), Decent Work and Economic Growth (SDG 8) and Partnerships for the Goals (SDG 17)).

For future work, to maximize the effectiveness of adaptive e-learning, to enhance quality education and contribute to achieving the Sustainable Development Goals in Egypt. We should be considered: (Investment in Infrastructure, Faculty Training and Development, Collaboration with Stakeholders and Working to maintain data privacy).

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