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# The Effectiveness of a Training Program in Developing 21st-Century Skills and Its Impact on Enhancing Cognitive, Emotional, and Leadership Competencies to Achieve Sustainable Development Among University Students in Egypt

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## ABSTRACT

**The 21st century imposes contemporary and evolving demands for skills to address its increasing challenges and to achieve the Sustainable Development Goals (SDGs) through a generation of youth capable of leading their societies toward progress and prosperity. Accordingly, the present study aimed to design and implement a training program focused on developing 21st-century skills and to assess its impact and effectiveness in improving cognitive, emotional, and leadership competencies to support sustainable development among university students in Egypt.**

**The study adopted an experimental design involving 75 Egyptian university students majoring in psychology, randomly assigned into two groups: an experimental group that received a blended training program (delivered both online and face-to-face) consisting of 17 sessions, and a control group that received no training. Assessments were conducted before the program, after its completion, and in a follow-up evaluation one month later. An Arabic-language scale developed to measure cognitive, emotional, and leadership competencies was used.**

**Data were analyzed using t-tests and effect size calculations to evaluate the program's effectiveness. The results showed that participants in the experimental group exhibited significant improvement in their cognitive, emotional, and leadership competencies as core skills for sustainable development, compared to the control group, with statistically significant differences ($p < .05$). Effect size analyses revealed high values across all domains ($\eta^2$ between 0.915 and 0.925), reflecting the strong impact of the training program.**

**The follow-up assessments conducted one month after the program confirmed the retention of these acquired competencies. The researchers concluded that the targeted training program was effective in enhancing students' cognitive, emotional, and leadership competencies by raising their 21st-century skills, thereby contributing to their readiness to face future challenges and engaging actively in achieving sustainable development. The study recommends integrating such interventions within educational frameworks to foster transformative and sustainable societal development.**

**KEYWORDS**:

**21st-century skills, cognitive competencies, emotional competencies, leadership competencies, training program, sustainable development**

# فاعلية برنامج تدريبي في تنمية مهارات القرن الحادي والعشرين وتأثيره في تحسين الكفاءات المعرفية والوجدانية والقيادية من اجل تحقيق التنمية المستدامة لدى طلاب الجامعة في مصر

## المستخلص

يفرض القرن الحادي والعشرون متطلبات معاصرة ومتطورة من المهارات لمواجهة تحدياته المتزايدة وتحقيق أهداف التنمية المستدامة بجيل من الشباب القادرون على قيادة مجتماعاتهم نحو التقدم والازدهار، لذلك سعت الدراسة الحالية إلى تقديم برنامج تدريبي في تنمية مهارات القرن الحادي والعشرين وقياس تأثيره وفعاليته في تحسين الكفاءات المعرفية والوجدانية والقيادية من اجل تحقيق التنمية المستدامة لدى طلاب الجامعة في مصر، واعتمدت الدراسة الحالية على تصميمًا تجريبيًا تضمن ٧٥ طالبا جامعيا مصريًا من تخصص علم النفس تم تقسيمهم إلى مجموعتين بطريقة عشوائية: مجموعة تجريبية تلقت برنامجًا تدريبيًا مدمجًا (عن بعد ووجهًا لوجه) مكوّنًا من ١٧ جلسة، ومجموعة ضابطة لم تتلق أي تدريب. أُجريت التقييمات قبل بدء البرنامج، وبعد انتهائه، بالإضافة إلى تقييم متابعة بعد مرور شهر من انتهاء البرنامج، وذلك باستخدام مقياس عربي أُعد لقياس كفاءات الطلاب المعرفية والوجدانية والقيادية. وتم تحليل البيانات من خلال اختبارات (t) وحساب حجم الأثر لتقدير فعالية البرنامج. وأظهرت نتائج الدراسة أن المشاركين في المجموعة التجريبية حققوا تحسنًا ملحوظًا في الكفاءات المعرفية والوجدانية والقيادية كمهارات لتحقيق التنمية المستدامة نتيجة تدريبهم وتحسن مهارات القرن الحادي والعشرين لديهم مقارنةً بالمجموعة الضابطة، وذلك بدرجة دالالة إحصائيًة ($p < .05$) كما أظهرت تحليلات حجم الأثر قيمًا مرتفعة في جميع المجالات ( $\eta^2$ بين ٠.٩١٥ و٠.٩٢٥)، مما يعكس التأثير القوي للبرنامج التدريبي. وأكدت تقييمات المتابعة التي أُجريت بعد شهر من انتهاء البرنامج استمرارالاحتفاظ بهذه المهارات المكتسبة. واستخلص الباحثون فعالية البرنامج التدريبي الموجهة في تعزيز كفاءات الطلاب المعرفية والانفعالية والقيادة لطلاب الجامعة بارتفاع مهارات القرن الحادي والعشرين لديهم، مما يسهم في جاهزيتهم لمواجهة التحديات المستقبلية ومشاركتهم الفاعلة في تحقيق أهداف التنمية المستدامة. وأوصى الباحثون بإن دمج مثل هذه التدخلات ضمن الأطر التعليمية يمكن ان يسهم في إحداث تحول وتطورمجتمعي مستدام.

**الكلمات المفتاحية**:

مهارات القرن الحادي والعشرين، الكفاءات المعرفية، الكفاءات الوجدانية، الكفاءات القيادية، البرنامج التدريبي، التنمية المستدامة.

## Introduction

**Recent years have witnessed a notable international focus on sustainable development issues. Numerous countries worldwide have agreed upon a set of goals aimed at the well-being of humanity, termed the "Sustainable Development Goals." These goals empower individuals to reach their full potential and advocate for a range of noble objectives that seek to enhance the quality of life in societies.**

**Many countries have found solutions to numerous challenges through the achievement of the Sustainable Development Goals. Consequently, nations around the world strive to realize these goals through their various institutions, such as government agencies, educational institutions, and civil society organizations within the country (Abdullah Bashir, 2019).**

**Adolescence is considered one of the most critical stages that societies focus on, as it represents the next generation and the future of Arab nations. While the world is currently experiencing rapid scientific and technological advancements, this necessitates increased competition. If Arab nations want to remain competitive and thrive, they need a workforce with a scientific background, skills, and competencies that keep pace with daily changes, in addition to continuous learning and training to achieve sustainable development in Arab societies.**

**Hence, there is an urgent need to focus on adolescents, who represent the future of nations, especially with the emergence of numerous internal and external challenges. These challenges have led to a shift in the responsibilities and roles of graduates in general, and graduates of education colleges in particular, as they are entrusted with transferring knowledge and skills to their future students. Therefore, there is a pressing need to pay attention to student teachers (Jihad Jamal et al., 2020).**

**Moreover, numerous studies and market reports, such as the study by Omar Al-Daraan (2022), have indicated a real gap between what adolescents learn within educational institutions and the actual skills and competencies required by the labor market. To build a distinguished personality for adolescents in general, and university students in particular, and to achieve a true renaissance in our Arab societies, our task necessitates bridging the gap between the actual reality and educational systems. This will enable us to achieve the Sustainable Development Goals in a practical and effective manner.**

**Several studies have examined the relationship between the Sustainable Development Goals and the competencies of adolescent students in universities. The studies by Pesha (2021) and Cebrián (2015)**

**both highlighted the importance of key competencies in the field of sustainable development, with Pesha focusing on developing these competencies while Cebrián emphasized the need for comprehensive curriculum development. The studies by Cörvers (2016) and Molderez (2018) supported this view, with Cörvers recommending the adoption of effective teaching methods such as problem-based and project-based learning to develop these competencies, while Molderez pointed to the importance of using practical experiences and continuous training to enhance a variety of sustainability-related competencies. It can be said that these studies shed light on the importance of integrating the Sustainable Development Goals into the education of university students and on the possibility of achieving this through a range of educational approaches.**

## Problem of the Study:

**We cannot overlook the fact that the global community is witnessing a series of changes and developments in economic, social, and scientific aspects. This has led to the emergence of global expectations calling for a shift from focusing on content-based education as the primary goal to focusing on the learner and their professional preparation. This is to ensure they are capable of competing and keeping pace with the demands of the 21st century and the Fourth Industrial Revolution (Kamal, 2023).**

**Furthermore, the reality of Arab education indicates that it does not meet the true needs of Arab society. Some argue that the human output of education in the Arab world is far below its material input, particularly in terms of quality rather than quantity. Consequently, graduates struggle to enter the local and global labor market due to their inability to grasp the knowledge and skills necessary for the workforce (Ali Derbala & Amani Hamza, 2016).**

**The issue of preparing Arab adolescents who possess a set of modern competencies that enable them to excel globally is a crucial concern for Arab society, especially if these adolescents possess qualities and skills that make them part of achieving the Sustainable Development Goals. The Sustainable Development Goals are a global call to action to eradicate poverty, protect the environment and climate, and ensure that people everywhere enjoy peace and prosperity. This is what makes the Arab world more distinguished and advanced.**

**Building the character of adolescents in light of technological, economic, and climatic changes is one of the main pillars that the Arab world should focus on. Our Arab societies are witnessing rapid changes due to various reasons, such as tremendous technological advancements, the disappearance and replacement of traditional jobs with new ones, and the**

**global demands increasingly voiced by the world in general and Arab societies in particular.**

**Recently, levels of anxiety about the future have risen among adolescents and their families due to several factors, including:**

1. **The increase in science fiction films that focus on future technology and portray it as a threat to humanity.**
2. **Global climate change, which the world is witnessing, and which threatens economic resources in many countries.**
3. **Rising global poverty rates require skills such as entrepreneurship and innovative thinking.**
4. **The spread of numerous diseases and epidemics among populations.**
5. **Global threats of depleting non-renewable energy sources and the need to find alternative sources of renewable energy.**
6. **The escalating use of artificial intelligence in all fields.**

**This is further emphasized by the results of the report issued by the World Economic Forum on the Future of Jobs in the period (2020-2025). The report predicted an increased focus on technology-related jobs, along with the likely displacement of 85 million current jobs. However, it also anticipated the emergence of 97 million alternative jobs to meet global demands. Additionally, 42% of the skills and competencies required in the current labor market are expected to change (Philack & Davis, 2019). Therefore, it has become imperative for adolescents to acquire a set of skills and competencies that enable them to confidently enter the Arab and global labor markets without fear or anxiety, as they now possess the means to do so easily.**

**This is also supported by the findings of several previous studies, such as the study by Latifa Majid and Dumia Ibrahim (2014), which identified the skills and competencies that university students should acquire: problem-solving and decision-making skills, self-awareness and empathy skills, creative and critical thinking skills, emotional regulation and stress management skills, and communication and interpersonal skills.**

**Additionally, the study by Hani Al-Batsh (2019) classified a set of skills required for the labor market, which are:**

| | | |
|---|---|---|
| **Technological and linguistic skills** | **Entrepreneurship** | **Leadership** |
| **Critical thinking and innovation skills** | **Communication Skills** | **Problem Solving** |
| **Decision Making** | **Continuous Learning** | **Teamwork** |

**(Ghada Hamza, 2016) believes that thinking about the future of Arab universities requires dealing with three variables: scientific and technological progress, the quality of education, and the time factor.**

**Therefore, higher education institutions in Arab countries must be developed through:**

- **Flexibility in dealing with scientific and technological progress.**
- **Applying cognitive skills in practical life.**
- **Mastering creative thinking skills during knowledge production and dissemination.**

**A study by Nessipbayeva (2012) indicates the most important competencies that student teachers should possess, in particular: decision-making, active listening, planning, time management, effective communication, problem-solving, persuasion, and teamwork.**

**Furthermore, a study by Ibrahim Mohammed (2023) called for the necessity of focusing on identifying the needs of teachers and transforming them into skills and competencies that can be trained and developed to match the needs of the labor market.**

**This aligns with the researcherss' findings from a pilot study where they surveyed 25 graduates from the Faculty of Education about the most important competencies they acquired during their university studies and the extent of the relationship between what they learned and what they offer to their students in classrooms. 78% of them indicated a clear disconnect between the competencies they acquired during their university studies and the competencies required for the labor market. Additionally, they expressed a need for a set of essential competencies due to the tremendous development in school curricula, particularly competencies related to achieving sustainable development goals.**

**This prompted the researchers to consider proposing and studying the effectiveness of a training program based on achieving sustainable development goals for adolescents in general and for student teachers in particular. Student teachers are considered one of the most important groups that we must focus on as they are the nucleus of the future generation in Arab societies. The program was designed and implemented with consideration for the absence of any cultural or linguistic barriers, making it easy and accessible to implement within all Arab communities.**

**Based on the aforementioned studies, which indicate a real gap between pre-service teacher programs in colleges of education and the needs of school students, it is imperative to prepare a generation capable of achieving sustainable development goals and overcoming the obstacles and challenges of the current era.**

## Objectives of the Study:

**The current study aims to:**

1. **Prepare a list of the main competencies needed by university students in light of the sustainable development goals.**
2. **Verify the effectiveness of the proposed training program on sustainable development goals in developing the competencies of university students.**

## Importance of Study:

**The importance of the current study lies in its variables, the nature of the relationships and effects it addresses, and the most important results achieved by the researcherss, as presented below:**

**Theoretical Importance:**

- **The variables of the current study are important in educational psychology as they combine three main branches: (cognitive psychology, affective psychology, and leadership psychology), which are of great importance in the current era and contribute to adolescents acquiring the most important sustainable development goals.**
- **The current study adds to the Arabic library a training program designed to develop the competencies of Arab adolescents.**

**Applied Importance: The applied importance of the current study lies in the number of groups that can benefit from the study, which the researchers present as follows:**

- **University students: Designing programs in cognitive, affective, and leadership psychology and developing one of its variables, the focus of the current research (competencies of Arab adolescents), using a hybrid training system can improve positive aspects and overcome negative emotions in adolescents.**
- **Researchers in the field of cognitive and emotional psychology and leadership psychology.**
- **Designers of skills development programs, emotional development, and human resources development: It provides them with activities presented in a hybrid training system in the field of emotions, as well as a list of important competencies for the target variables of the training programs.**

## Theoretical Framework of the Study:

### Sustainable Development:

**The concept of sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development calls for concerted efforts to build the future.**

**The concept of sustainable development was first launched in 1987 in the report "Our Common Future," prepared by the World Commission on Environment and Development. It means addressing the interrelated crises facing human civilization by focusing on three essential elements: economic development, social justice, and environmental protection. This concept was adopted globally at the Earth Summit held by the United Nations Conference on Environment and Development in 1992 in Rio de Janeiro (Islam Elbanna, 2014).**

**Sustainable Development Goals:**

**Sustainable development aims to achieve a better and more sustainable future for all. It seeks to reduce the negative impacts of poverty, inequality, climate change, and environmental degradation, and to achieve prosperity, peace, and justice (Atmaca et al., 2019). The Sustainable Development Goals are as follows:**

1. **End poverty in all its forms everywhere.**
2. **End hunger, achieve food security and improved nutrition and promote sustainable agriculture.**
3. **Ensure healthy lives and promote well-being for all ages.**
4. **Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.**
5. **Achieve gender equality and empower all women and girls.**
6. **Ensure availability and sustainable management of water and sanitation for all.**
7. **Ensure access to affordable, reliable, sustainable and modern energy for all.**
8. **Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.**
9. **Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.**
10. **Reduce inequality within and among countries.**
11. **Make cities and human settlements inclusive, safe, resilient and sustainable.**
12. **Ensure sustainable consumption and production patterns.**

13. **Take urgent action to combat climate change and its impacts.**
14. **Conserve and sustainably use the oceans, seas and marine resources for sustainable development.**
15. **Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.**
16. **Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.**
17. **Strengthen the means of implementation and revitalize the global partnership for sustainable development.**

Sustainable development is based on four main elements:

- **Productivity: it refers to the individual's ability to contribute to increasing production.**
- **Equality: ensuring equal opportunities among members of society.**
- **Sustainability: means finding additional and alternative resources instead of consuming all resources in the present without caring for future generations.**
- **Empowerment: enhancing human capabilities so that individuals can achieve self-realization. (Israa Khudir et al., 2015).**

**The results of the Cirit & Aydemir (2021) study indicate the necessity of rapid intervention to reduce the various problems caused by humans to the environment and life issues in the current era. Meanwhile, the study by Majid Al-Khatib (2022) emphasized that human efforts to solve these problems will not be achieved unless we start with humans themselves, as they are the primary beneficiaries of the environment and the main source of disrupting the ecological balance.**

**While Fatima Abdul Jalil (2015) believes that the concept of sustainable development has received significant attention, with many international organizations holding numerous conferences focused on environmental education and sustainable development due to the role that sustainable development plays in positive changes in individual behavior, studies by Sahin, Ertepinar & Teksoz (2012) and Hani Abdul Sattar (2019) emphasized the need to train teachers to enhance and develop their abilities to deal with the issue of unsustainability. Their understanding of sustainable development helps prepare their students to face future challenges related to the environment and its requirements and preservation.**

## Dimensions of Sustainable Development:

**Alaa Fathi's (2022) study refers to the following dimensions of sustainable development:**

- **Environmental Dimension: Focuses on preserving environmental aspects and conserving all its various resources.**
- **Economic Dimension: The economic growth of nations, as countries seek to reduce their consumption of energy and resources and optimize the use of resources to raise the standard of living of individuals.**
- **Social Dimension: Relates to all aspects of social justice and seeks to improve the standard of social living.**

**While the study by Aqel bin Abdulaziz (2021) indicated that it is necessary to add the technical and administrative aspects in order to preserve the environment and its multiple resources.**

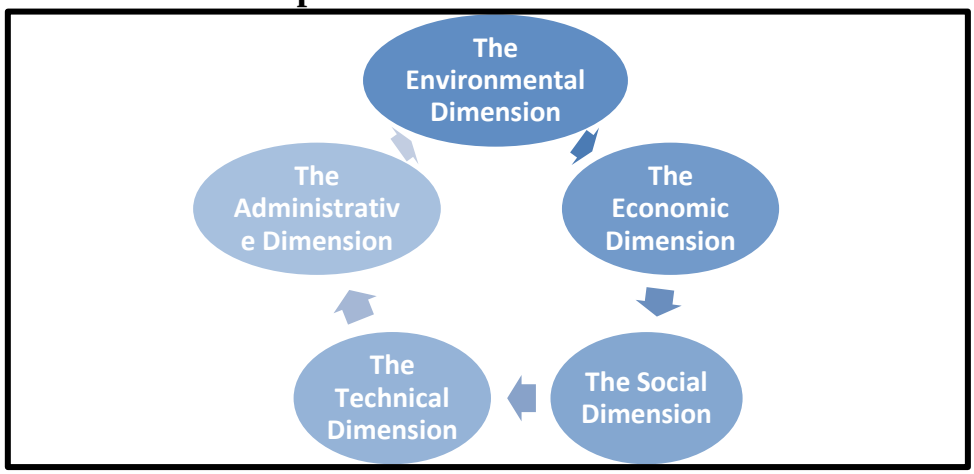


**Figure (1) Dimensions of Sustainable Development**

**Principles of Sustainable Development:**

**Sustainable development is based on a set of principles that uplift societies, nations, and their institutions. Musa Khamis (2003) summarized them as follows:**

- **Empowerment: Empowering adolescents and youth to make decisions and offer innovative solutions to deal with various issues.**
- **Cooperation: Encouraging teamwork and collaboration to carry out different tasks.**
- **Community Participation: Encouraging everyone to participate in various community issues in all aspects.**
- **Equity: Ensuring everyone's participation in sustainable development without obstacles to achieving social justice.**

- **Continuity: Focusing on achieving goals permanently, not temporarily.**

**And the researchers express them in the following figure:**

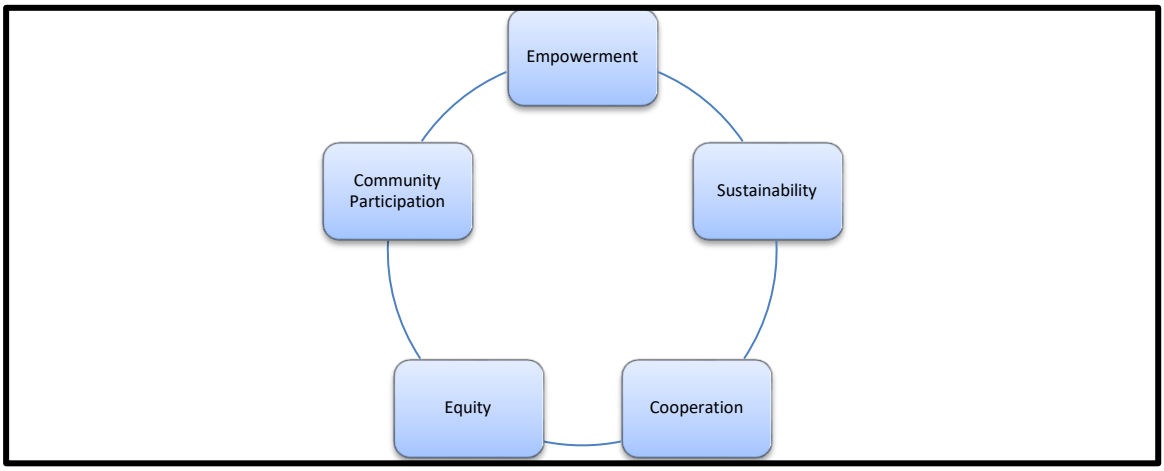


**Figure (2) Principles of Sustainable Development**

**In light of the aforementioned principles, the researchers derive during the current study the competencies that lead to the availability of the principles of sustainable development.**

**The researchers adopt these principles to prepare the training program sessions. All sessions of the proposed training program are based on the aforementioned principles to ensure the participation of the Arab adolescent generation in achieving the renaissance of our Arab societies.**

**Competencies:**

**The concept of competencies has gained significant importance, especially in the last quarter of the past century. There have been many attempts to define competencies, which we present below:**

**Ibrahim Muhammad (2023, 440) defines competencies as "the set of knowledge, skills, scientific experiences, and professional values that a student teacher must possess to be able to perform his tasks with the greatest possible degree of accuracy and mastery and thus distinguish himself from his peers at the same level. functional level."**

**While Amal Al-Anzi (2022) defined them as "those abilities, skills, knowledge, traits, and professional and ethical values that are determined through the behaviors necessary to perform good work according to the required standards, because the good exploitation of abilities, skills, knowledge, traits, and professional and ethical values is reflected in achieving excellence in performance.**

**Mohammad Ahmad (2013) defines competency as "any knowledge, skill, ability, attitude, behavior, or personal trait that can be observed and**

**measured, and must be present to practice a job or profession and contribute to improving job performance." Or "it is the knowledge, skill, and tendencies that make someone able to effectively perform a job or profession at the level of the required or expected specifications," which are phrases that describe behavior, not traits or beliefs, although they reflect tendencies and are related to job or profession performance, and are measured by what is known of acceptable specifications for that job and can be developed through training (Katane, 2010). In terms of procedure, the researchers defines competencies as "the individual's possession of a set of cognitive, affective, and leadership knowledge and skills that help him excel in the labor market and keep pace with the rapid changes in the world around us."**

**Competency consists of three main components, as shown in the following figure:**

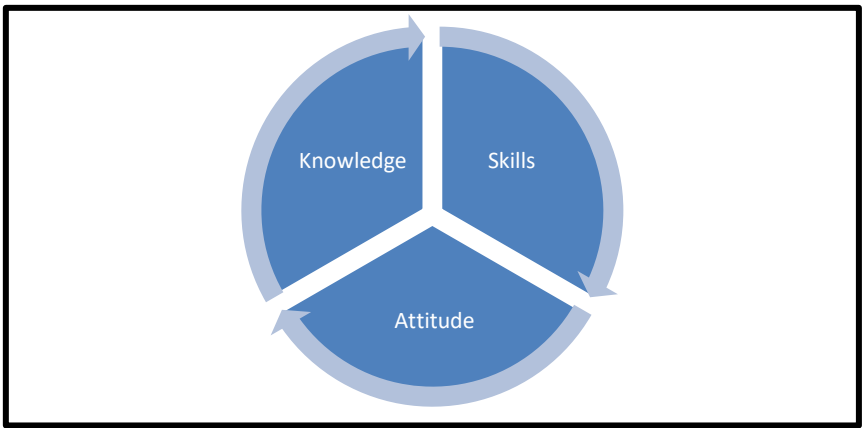


**Figure (3) Components of competency prepared by the researchers**

**Importance of competencies: The concept of competencies plays a major and fundamental role in the labor market, as competencies are a main requirement for building the personality of the Arab adolescent. The study of Mohammed Tolan (2015) identified the importance of functional competencies as follows:**

- **Selection and appointment: Competencies help in selecting and appointing employees in the institution.**
- **Promotion and career paths: Promotion and professional development depend on the likelihood of employees' success in institutions.**
- **Training and development: Functional competencies help identify the functional needs of employees.**

**While Ashraf Abdel Qawi (2018, 162-163) indicates that professional competencies are of great importance in the educational process, as shown in the following points:**

1. **It strengthens the relationship between education and work and provides the requirements of the labor market.**
2. **It increases students' motivation to participate in the learning process.**
3. **It qualifies students for the field of work and life in general.**
4. **It links knowledge, skills, and affective aspects, thus achieving integration between theoretical and practical aspects.**

**In light of the aforementioned theoretical framework, the researchers believes that the competencies of the university students can be divided into three main types, as shown in the following figure:**

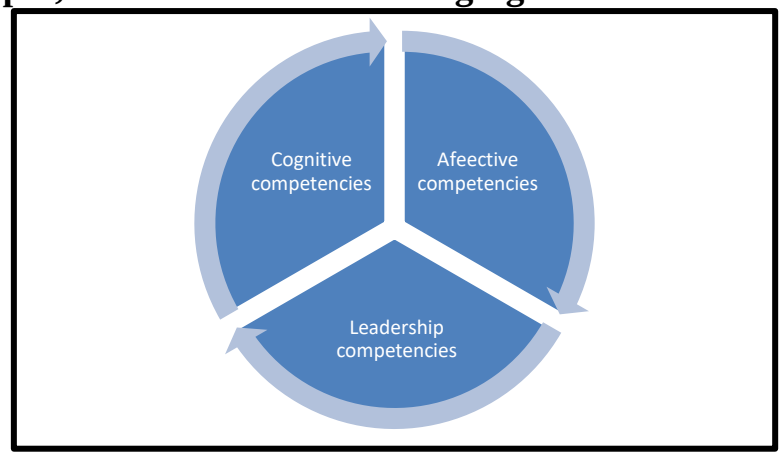


**Figure (4) Types of competencies of the university students**

1. **Cognitive Competencies: These are the set of knowledge, information, and concepts necessary for an individual in their field of work. They include awareness of labor market requirements, problem-solving skills, and critical thinking.**
2. **Affective Competencies: These refer to the emotional traits that distinguish an individual and are evident in their interactions with others and their ability to adapt to changing circumstances.**
3. **Leadership Competencies: These include the individual's ability to positively influence subordinates, their ability to develop work methods, and motivate subordinates towards effectiveness, innovation, and creativity by interacting with them, investing in their potential, and providing an ideal climate for interaction within the framework of human relations.**

**The researchers chose these specific competencies for the following reasons:**

1. **Cognitive competencies are the first step, encompassing a set of skills necessary for the individual to be able to deal with various problems and crises within their society and in the world around them.**

2. **Affective competencies are among the most important criteria for an individual's success. If the individual is able to master dealing with their emotions while interacting with others and in various stressful and difficult situations, this is the beginning of their ability to reach the emotional maturity required for the advancement of societies.**
3. **Leadership competencies are the fundamental criterion for the success of Arab societies and countries, as they include a set of basic and required sub-competencies to achieve the goals of sustainable development and to change societies in general, and Arab societies in particular.**

**The results of many studies indicate the importance of these specific branches, such as the study by (Toom & Inshakova, 2019), where the results of the study emphasized the necessity of focusing on cognitive competencies in particular, as they play a pivotal role during university studies and after graduation. Meanwhile, the results of the study by (Miranda, Galan, & Pimentel, 2021), which reviewed 19 scientific studies, clarified the role of affective competencies in building the personality of university students in general and student teachers in particular.**

**In light of the previous presentation, the research hypotheses can be formulated as follows:**

1. **There are no statistically significant differences between the mean scores of males and females in the research sample on the university students Competencies Scale.**
2. **There are no statistically significant differences between the mean scores of students in the control and experimental groups in the pre-measurement on the university students Competencies Scale.**
3. **There are statistically significant differences between the mean scores of students in the control and experimental groups in the post-measurement on the university students Competencies Scale.**
4. **There are statistically significant differences between the mean scores of students in the experimental group in the pre- and post-measurements on the university students Competencies Scale.**
5. **There are no statistically significant differences between the mean scores of students in the experimental group in the post- and follow-up measurements on the university students Competencies Scale.**

## Methodology and Procedures:

- **Sample:**
- **Sample for verifying validity and reliability:**

**A random sample of university students was selected for the academic year 2022-2023. The sample size for the Adolescent Competencies Questionnaire was (79) male and female students with an average age of (21.66) and a standard deviation of (1.47).**

**Table (1) Distribution of research sample individuals according to gender variable (n=79)**

| Gender | Number | Percentage |
|---|---|---|
| Males | 16 | 18.67% |
| Females | 63 | 81.33% |

**Main sample of the study: The study was conducted on two groups (experimental and control) of students majoring in Psychology. The experimental group consisted of (45) male and female students with an average age of (22.89) years and a standard deviation of (1.62) years. The control group consisted of (30) students with an average age of (22.67) years and a standard deviation of (1.51) years.**

**Table (2) Distribution of research sample individuals according to research group variable (n=75)**

| Group | Number | Percentage |
|---|---|---|
| Experimental | 45 | 60% |
| Control | 30 | 40% |

**The reason for choosing this sample is based on the following:**

**By reviewing the descriptions of current courses in schools and the reports of the McKinsey Foundation and future jobs mentioned in previous studies, the researchers found that it is necessary to focus on this particular stage and not others.**

- **The university stage represents the late adolescence stage for the study subjects, a stage in which interest in social relationships with friends and peers, and self-image increases, which increases the necessity of focusing on emotional and leadership competencies.**
- **Choosing students from the Faculty of Education (student teachers) and training them on a program to develop competencies of all kinds will certainly have a positive impact on the learning of their students in the future.**

**The participants were drawn from psychology majors at the Faculty of Education during the 2022–2023 academic year. A total of 75 students were included and randomly assigned to either the experimental group (n = 45) or the control group (n = 30). Randomization was conducted using a computerized random number generator after stratifying by gender to ensure proportional representation in both groups.**

**Training Delivery Method:**

**The training program was delivered through a hybrid model that combined synchronous online sessions and asynchronous digital activities via the university's learning management system. Each of the 17 sessions lasted 60 minutes and included interactive components such as role-playing, reflective discussions, and digital assignments. All sessions were conducted using Zoom, and supplementary materials were provided through the university digital platform.**

**This delivery method ensured flexibility and accessibility while maintaining instructional quality and participant engagement. Attendance and participation were tracked through digital logs and reflective submissions.**

**Study Tools:**

1. **University students Competencies scale: The university students Competencies scale was initially developed by referring to:**

- **The theoretical framework, including a study of some literature related to competencies.**
- **The Sustainable Development Goals for 2030.**
- **The McKinsey Report (McKinzey, 2023).**
- **The results of the exploratory study conducted by the researchers, where the list was presented to a group of judges in the field of educational psychology.**
- **Experts in various fields of work to give their opinions on its suitability, accuracy, and the relevance of competencies to the adolescence stage in the Arab world.**
- **Suggestions to delete, modify, or add any other competencies. The researchers concluded with the Arab Adolescent Competencies List, which consists of three main competencies and 20 sub-skills. The judges' opinions indicated that there was an agreement to delete five sub-competencies due to their unsuitability. Thus, the final list consists of 3 main competencies and 15 sub-competencies.**

2. **University students Competencies Scale: A. Validity of the Scale: The researchers relied on the following to calculate the validity of the scale:**

- **Content Validity (Expert Validity) The initial version of the scale was presented to five faculty members in the field of educational psychology who had studies or research in this field or one of the variables related to it.**

- **This version included 100 items to ensure the suitability of the statements to the concept of being measured, identify ambiguity in some statements for modification, and delete any statements that were not related to the concept of competencies or not suitable for the nature and characteristics of the students.**
- **In light of the opinions of the judges, (25) items were deleted due to repetition or unsuitability for the nature and characteristics of the sample, which did not receive an agreement rate between 90% - 100%.**
- **The scale thus became 75 items and was applied to the pilot study sample to finalize the final version of the scale.**
- **Discriminant Validity:**

**Discriminant validity of the scale was calculated by calculating the significance of the differences between the upper quartile and lower quartile of children's scores on the scale (top 25% and bottom 25%). The significance of the differences between the upper and lower quartiles was calculated using the "T" test for the significance of the differences between the mean scores of students in the upper and lower groups. Table (3) illustrates this.**

**Table (3) Mean, Standard Deviation, T-value, and Significance Level of the Difference Between the Upper and Lower Quartiles of Students' Scores on the Scale**

| Quartiles | Number | Mean Rank | Sum of Ranks | Z-value | Significance Level |
|---|---|---|---|---|---|
| Lower Quartile | 20 | 8.36 | 167.20 | 5.22 | 0.01 |

**It is clear from Table (3) that the Z value is significant at a significant level of 0.01, which confirms the high discriminant validity of the scale.**

**Confirmatory Factor Validity: Using the statistical analysis program Mplus VERSION 7, the researchers conducted confirmatory factor analysis, in which the existence of three correlated latent factors was assumed, with the scale items loading onto them. Table (4) shows the standardized and unstandardized regression weights for the loadings of the items on the latent factors, as well as their statistical significance. Table (5) shows the goodness-of-fit indices for the proposed model in the competencies scale and their interpretation. Figure (4) shows the proposed factor structure of the competencies scale.**

**Table 4: Standardized and Unstandardized Regression Weights for the Loadings of the Items on the Latent Factors of the Competencies scale Resulting from Confirmatory Factor Analysis, and Their Statistical Significance**

| Factors | Item No. | Standardized Regression Weight | Unstandardized Regression Weight | Standard Error | Critical Ratio | Significance |
|---|---|---|---|---|---|---|
| Cognitive Competencies | 1 | 19.22 | 2.99 | 0.205 | 93.90 | 0.01 |
| | 2 | 21.18 | 2.48 | 0.339 | 62.54 | 0.01 |
| | 3 | 21.33 | 3.51 | 0.366 | 58.23 | 0.01 |
| | 4 | 21.19 | 5.04 | 0.424 | 49.93 | 0.01 |
| | 5 | 19.60 | 6.17 | 0.523 | 37.49 | 0.01 |
| Affective Competencies | 6 | 17.94 | 11.40 | 0.608 | 29.49 | 0.01 |
| | 7 | 19.76 | 3.50 | 0.479 | 41.24 | 0.01 |
| | 8 | 16.05 | 14.19 | 0.707 | 22.70 | 0.01 |
| | 9 | 17.72 | 14.57 | 0.517 | 34.26 | 0.01 |
| | 10 | 18.67 | 9.68 | 0.520 | 35.91 | 0.01 |
| Leadership Competencies | 11 | 20.01 | 4.92 | 0.451 | 44.35 | 0.01 |
| | 12 | 21.44 | 2.85 | 0.339 | 63.33 | 0.01 |
| | 13 | 20.42 | 4.69 | 0.451 | 45.24 | 0.01 |
| | 14 | 19.27 | 6.22 | 0.517 | 37.30 | 0.01 |
| | 15 | 19.87 | 7.18 | 0.532 | 37. | |

**Table (4) shows that all items of the scale were significant at the level of (0.01). Table (5) shows the goodness-of-fit indices for the proposed model in the competencies scale, which are as follows:**

**Table (5): Goodness-of-Fit Indices for the Proposed Model in the Competencies Scale**

| Goodness-of-Fit Indices | Value | Ideal Range |
|---|---|---|
| Chi-Square (CMIN) | 234.28 | |
| Significance Level | 0.000 | Significant at 0.01 |
| Degrees of Freedom (DF) | 105 | |
| Chi-Square to DF Ratio | 2.231 | The ideal range is 1 to 3 |
| Goodness-of-Fit Index (GFI) | 0.832 | Closer to 1 is ideal |
| Normed Fit Index (NFI) | 0.772 | Closer to 1 is ideal |
| Incremental Fit Index (IFI) | 0.769 | Closer to 1 is ideal |
| Expected Cross-Validation Index (ECVI) for Expected Model | 0.872 | Expected model is less than saturated |
| Expected Cross-Validation Index (ECVI) for Saturated Model | 0.878 | |
| Comparative Fit Index (CFI) | 0.879 | Closer to 1 is ideal |
| Root Mean Square Error of Approximation | 0.0135 | Closer to 0 is ideal |

| | | |
|---|---|---|
| (RMSEA) | | |
| Tucker-Lewis Index (TLI) | 0.853 | Closer to 1 is ideal |

**Table (5) demonstrates the acceptance of the confirmatory factor analysis model, which confirms the existence of three latent factors: cognitive competencies, affective competencies, and leadership competencies.**

**This is consistent with This is confirmed by the goodness-of-fit indices, which fall within their ideal range. Figure (4) illustrates the proposed factor structure of the competencies scale, as follows.**

**Reliability:**

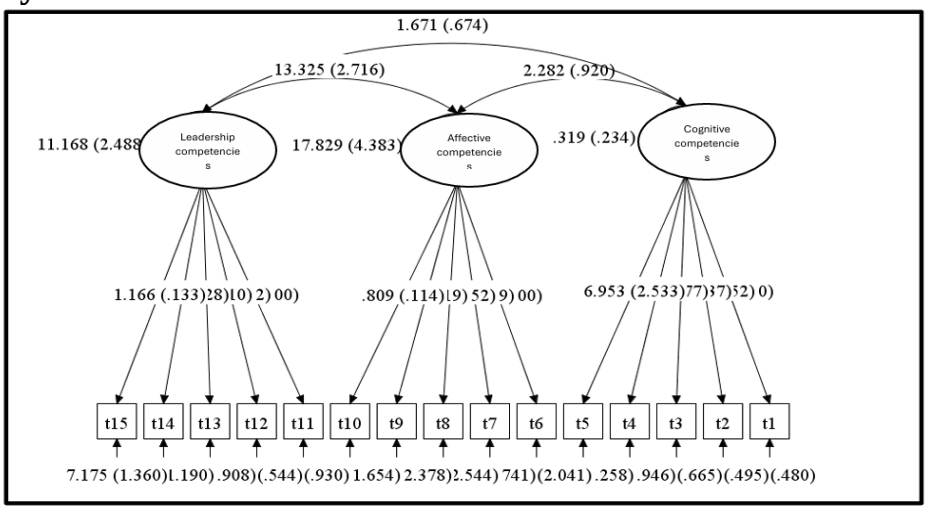


**Figure (4) Proposed factor structure of the university students competencies scale**

**The reliability of the scale was verified using the following methods:**

**McDonald's Omega Method: The reliability value was calculated using McDonald's Omega coefficient for each dimension of the scale. The values of the reliability coefficients can be shown in Table (6) as follows:**

**Table (6): McDonald's Omega Reliability Coefficient Values for the Dimensions of the Competencies Scale**

| Scale Dimensions | McDonald's Omega Coefficient Value |
|---|---|
| First: Cognitive Competencies | 0.765 |
| Second: Affective Competencies | 0.776 |
| Third: Leadership Competencies | 0.782 |
| Overall Scale | 0.774 |

**Table (6) shows that the reliability coefficients of the university students Competencies Scale, both for the overall scale and its subscales, were relatively high, ranging between (0.765) and (0.782), which indicates the reliability of the scale. The overall reliability coefficient of the scale was (0.774), which is a scientifically acceptable value and indicates the accuracy of the scale as a measurement tool.**

**Re-application coefficients were calculated for the dimensions and total scale, and table number (7) illustrates this:**

**Table (7): Re-application Coefficients for Dimensions and Total Scale of Murals**

| Scale Dimensions | Correlation Coefficient Between Applications |
|---|---|
| Cognitive competencies | 0.836 |
| Affective competencies | 0.841 |
| Leadership competencies | 0.829 |
| The Scale as a Whole | 0.835 |

**Table (7) shows that the values of the correlation coefficients, whether for the scale as a whole or its sub-dimensions, were relatively high, ranging between (0.829) and (0.841). This indicates the stability of the scale. The correlation coefficient for the scale as a whole reached (0.835), which is a scientifically acceptable value.**

**Internal Consistency of Scale Items:**

**To ensure the internal consistency of the scale, the researchers calculated the correlation coefficients between the score of each item of the scale and the total score of the scale after applying it to the pilot sample. Table (8) shows the correlation coefficients.**

**Table (8) Correlation Coefficients Between the Score of Each Item of the Scale and the Total Score of the Scale (N=75)**

| Item | Correlation with Total Score | Item | Correlation with Total Score | Item | Correlation with Total Score | Item | Correlation with Total Score |
|---|---|---|---|---|---|---|---|
| 1 | 0.727** | 20 | 0.727** | 39 | 0.749** | 58 | 0.680** |
| 2 | 0.716** | 21 | 0.795** | 40 | 0.698** | 59 | 0.735** |
| 3 | 0.846** | 22 | 0.759** | 41 | 0.769** | 60 | 0.716** |
| 4 | 0.766** | 23 | 0.675** | 42 | 0.812** | 61 | 0.541** |
| 5 | 0.866** | 24 | 0.816** | 43 | 0.699* | 62 | 0.768** |
| 6 | 0.728** | 25 | 0.766** | 44 | 0.712** | 63 | 0.730** |
| 7 | 0.738** | 26 | 0.816** | 45 | 0.805** | 64 | 0.742** |
| 8 | 0.811** | 27 | 0.728** | 46 | 0.842** | 65 | 0.685** |
| 9 | 0.852** | 28 | 0.683** | 47 | 0.835** | 66 | 0.752** |
| 10 | 0.795** | 29 | 0.783** | 48 | 0.846** | 67 | 0.698** |
| 11 | 0.815** | 30 | 0.759** | 49 | 0.847** | 68 | 0.841** |
| 12 | 0.843** | 31 | 0.738** | 50 | 0.728** | 69 | 0.866** |
| 13 | 0.683** | 32 | 0.724** | 51 | 0.788** | 70 | 0.841** |
| 14 | 0.756** | 33 | 0.827** | 52 | 0.625** | 71 | 0.835** |
| 15 | 0.825** | 34 | 0.739** | 53 | 0.805** | 72 | 0.826** |
| 16 | 0.712** | 35 | 0.654** | 54 | 0.895** | 73 | 0.827** |
| 17 | 0.730** | 36 | 0.745** | 55 | 0.823** | 74 | 0.775** |
| 18 | 0.758** | 37 | 0.820** | 56 | 0.786** | 75 | 0.738** |
| 19 | 0.820** | 38 | 0.823** | 57 | 0.789** | | |

****Correlation is significant at the 0.01 level (2-tailed).**

**Table (8) shows that the scale items were significant at the 0.01 level of significance, which indicates the internal consistency of the scale items.**

**Table (9) Correlation Coefficients Between the Score of Each Dimension of the Scale and the Total Score of the Scale**

| Dimension | Correlation with Total Score |
|---|---|
| Cognitive competencies | 0.832** |
| Affective competencies | 0.861** |
| Leadership competencies | 0.810** |

****Correlation is significant at the 0.01 level (2-tailed).**

**Program Objectives: Objectives are the main element that can be relied upon in developing the content of the program, choosing strategies, and various activities to achieve those objectives. The importance of objectives is represented in the following:**

**a. Help guide students' activities.**

**b. Help choose activities and strategies appropriate to the program's objectives.**

**c. Help assess students' performance.**

**Methods and Strategies Used in the Program: The program relied on the following methods and strategies:**

- **Direct teaching.**
- **Distance learning.**
- **Strategy training.**
- **Applied activities.**
- **Modeling.**
- **Discussion.**
- **Feedback.**

**Program Implementation: The program sessions are implemented through (17) sessions, each lasting (60) minutes, aiming to train students on how to develop the principles of sustainable development, which is reflected in their level of competencies (cognitive, affective, and leadership).**

**After completing the construction and preparation of the program, the researchers presented it to (5) specialized professors to express their opinions and suggestions regarding the program in terms of:**

**a. The extent to which the content of the program sessions is appropriate to achieve its objectives.**

**b. The extent to which the time specified for the program (the program implementation period) is appropriate to achieve its objectives.**

**c. The appropriateness of the methods and strategies used in the program sessions.**

**d. The extent to which the tasks are included in the program sessions are appropriate to achieve the objectives of each session.**

**e. The appropriateness of the linguistic formulation of the content and level of the students in the program sample.**

**Program Evaluation: The program uses three types of evaluation:**

**a. Pre-assessment. b. Formative assessment. c. Summative assessment.**

**Table 10. Summary of Training Sessions in the University Students' Competencies Program, Including Activities, Objectives, and Training Techniques**

| Session Number | Session Topic | Activity Name | Session Objective | Session Techniques |
|---|---|---|---|---|
| First | Orientation and Connection | Kick-Off Circle | * Establish rapport and introduce program goals | Dialogue - Brainstorming |
| Second | Collaborative Challenges | Bridge the Gap | * Strengthen collaborative and problem-solving strategies | Storytelling - Imagination - Discussion |
| Third | Adaptive Thinking | Bend the Rules | * Foster mental flexibility and adaptive reasoning | Discussion - Brainstorming - Experiencing Emotional Experience |
| Fourth | Creative Ideation | Brainstorm Burst | * Expand creative expression and idea generation | Imagination - Discussion - Emotional Modeling |
| Fifth | Mental Endurance | Stand Your Ground | * Cultivate resilience and positive peer influence | Discussion - Analysis |
| Sixth | Rational Judgment | Decide and Act | * Enhance clarity, analysis, and self-reflection | Discussion - Imagination - Analysis |
| Seventh | Interpersonal Clarity | Beyond Words | * Improve expressive and nonverbal communication | Role Playing - Discussion - Emotional Feedback - Emotional Stimulation |
| Eighth | Confidence Building | Trust Toss | * Build trust and encourage social initiative | Imagination - Discussion - Emotional Modeling |

| Session Number | Session Topic | Activity Name | Session Objective | Session Techniques |
|---|---|---|---|---|
| Ninth | Empathy and understanding | Through Their Eyes | * Promote empathy and interpersonal understanding | Brainstorming - Venting - Discussion |
| Tenth | Equity and Awareness | Two Perspectives | * Foster mutual respect and challenge stereotypes | Role Playing - Discussion - Emotional Feedback |
| Eleventh | Emotional Intelligence | Feel It First | * Nurture emotional awareness and regulation | Discussion - Expressive Writing |
| Twelfth | Influence and Persuasion | Speak Your Truth | * Strengthen persuasive communication and confidence | Storytelling - Discussion - Reflective Thinking |
| Thirteenth | Start-Up Mindset | Design Your Impact | * Explore entrepreneurial mindset and planning | Role Playing - Imagination - Discussion - Emotional Modeling |
| Fourteenth | Inner Strength | Dare to Try | * Empower self-belief and courage through practice | Storytelling - Imagination |
| Fifteenth | Innovation Leadership | Mission Briefing | * Inspire innovation and leadership in action | Discussion - Teamwork |
| Sixteenth | Vision-Driven Planning | Roadmap Rally | * Promote strategic thinking and time use | Discussion - Imagination - Expressive Writing |
| Seventeenth | Wrap-Up and Reflection | Celebration Circle | * Reflect on growth and celebrate achievements | Discussion - Evaluation - Application |

## Study Results:

**The first hypothesis: To test the validity of the hypothesis that states "There are no statistically significant differences between the mean scores of males and females in the research sample in performance on the murals scale," the Mann-Whitney U test for independent non-parametric samples was used through the SPSS statistical program. Table (8) illustrates this.**

**Table (11): Mean and sum of ranks, Z value, and significance level for the differences between the scores of males and females in the research sample in performance on the competencies scale (N=45)**

| Dimension | Gender | Number | Mean Rank | Sum of Ranks | Z Value | Significance |
|---|---|---|---|---|---|---|
| Cognitive competencies | Males | 8 | 21.81 | 174.50 | 0.283 | Not Significant at 0.05 |
| | Females | 37 | 23.26 | 860.50 | | |
| Affective competencies | Males | 8 | 19.88 | 159.00 | 0.743 | Not Significant at 0.05 |
| | Females | 37 | 23.68 | 876.00 | | |
| Leadership competencies | Males | 8 | 20.63 | 165.00 | 0.564 | Not Significant at 0.05 |
| | Females | 37 | 23.51 | 870.00 | | |
| Total | Males | 8 | 20.38 | 163.00 | 0.624 | Not Significant at 0.05 |
| | Females | 37 | 23.57 | 872.00 | | |

**There are no statistically significant differences between the average scores of males and females in the research sample in performance on the murals scale at a significance level of 0.05. This result differs from the 2008 study by Connerley, Mecham & Strauss, which confirmed the existence of differences between genders, especially in leadership murals. The study attributed these results to the existence of prior societal perceptions and assumptions that males are better than females in leadership murals. However, in the current study, students answered without any preconceived notions. This is in addition to women entering the workforce and holding many leadership positions in Arab societies at the present time without any consideration of gender. The researchers also believe that the results can be explained in light of the fact that the number of female participants in the sample is significantly larger than the number of males.**

**The second hypothesis aims to verify the claim that there are no statistically significant differences between the mean scores of the control and experimental group students in the pre-measurement of the competencies scale. The results of the independent t-test are presented in Table (12). We will examine the results in Table (12) to determine whether the hypothesis is supported.**

**Table (12) Means, Standard Deviations, T-Values, and Significance Levels of Differences Between Control and Experimental Group Students' Scores in the Pre-Measurement of the Competencies Scale**

| Dimension | Group | N | Mean | Standard Deviation | T-Value | Significance |
|---|---|---|---|---|---|---|
| Cognitive Competencies | Control | 30 | 88.93 | 3.94 | 1.13 | Not significant at 0.05 |
| | Experimental | 45 | 87.87 | 3.89 | | |
| Affective Competencies | Control | 30 | 75.83 | 4.22 | 0.333 | Not significant at 0.05 |
| | Experimental | 45 | 76.20 | 4.90 | | |
| Leadership Competencies | Control | 30 | 85.57 | 3.01 | 0.644 | Not significant at 0.05 |
| | Experimental | 45 | 86.11 | 3.80 | | |
| Total | Control | 30 | 250.33 | 11.17 | 0.052 | Not significant at 0.05 |
| | Experimental | 45 | 250.18 | 12.59 | | |

**Table (12) presents the means, standard deviations, t-values, and significance levels of the differences between the control and experimental group students' scores in the pre-measurement of the competencies scale. As shown in the table, there were no statistically significant differences between the mean scores of students in the control and experimental groups in the pre-measurement of the competencies scale at the 0.05 significance level. This result confirms the equivalence between the two groups (experimental and control) before the program, which helps to ensure the effectiveness of the training program after its implementation, if the study hypotheses are verified by the presence of differences between the two groups after applying the training program sessions.**

**The third hypothesis:**

**To verify the validity of the hypothesis that states "There are statistically significant differences between the mean scores of students in the control and experimental groups in the post-measurement of the competencies scale," an independent t-test for parametric samples was used through the SPSS statistical program. Table (13) illustrates the results.**

**Table (13 presents the means, standard deviations, t-values, and significance levels of the differences between the control and experimental group students' scores in the post-measurement of the competencies scale**

| Dimension | Group | N | Mean | Standard Deviation | T-Value | Significance |
|---|---|---|---|---|---|---|
| Cognitive Competencies | Control | 30 | 88.45 | 3.92 | 22.44 | Significant at 0.05 |
| | Experimental | 45 | 105.47 | 2.56 | | |
| Emotional Competencies | Control | 30 | 75.45 | 4.17 | 24.69 | Significant at 0.05 |
| | Experimental | 45 | 96.71 | 3.17 | | |
| Leadership Competencies | Control | 30 | 85.62 | 3.08 | 26.45 | Significant at 0.05 |
| | Experimental | 45 | 104.71 | 2.98 | | |
| Total | Control | 30 | 249.52 | 11.17 | 24.58 | Significant at 0.05 |
| | Experimental | 45 | 306.89 | 8.71 | | |

**Table (13) illustrates the following:**

**There are statistically significant differences at the 0.05 significance level between the mean scores of the control and experimental group students in the post-measurement of the competencies scale, favoring the experimental group. This improvement can be attributed to the training on the sub-competencies included within each main competency (cognitive, affective, and leadership). The students in the experimental group underwent a large number of diverse activities that enhanced their abilities and various competencies. These activities were designed in light of the dimensions, objectives, and principles of sustainable development, as evidenced by the following:**

- **Empowerment is one of the most important principles of sustainable development. Therefore, the training activities during the proposed program sessions focused on empowering the student-teacher as a representative sample of university students, in addition to transferring that knowledge and skills to future generations.**
- **Cooperation is the language of age, as a successful person cannot work alone. Hence, the training sessions sought to conduct many group activities and focus on the gains achieved during group work, not individual work. Additionally, they emphasized honing leadership competencies that strongly emerge during group work. We cannot overlook the main role that group activities play in developing creativity and innovation (Rahma Alian and Ahmed Abu Sun, 2014).**

- **The training sessions focused on developing the concept of community participation. The content of the sessions, strategies, and training activities encouraged student-teachers to provide innovative solutions to social problems and participate in various community activities.**
- **Fairness and justice were considered in every step of the implementation of the sessions. During the participation of the sample in the activities of the sessions, no restrictions were placed based on color, race, religion, or gender. Both male and female sample members participated in the activities and strategies of the training program.**

**The fourth hypothesis:**

**To verify the validity of the hypothesis that states "There are statistically significant differences between the mean scores of students in the experimental group in the pre- and post-measurement of the competencies scale," a paired samples t-test for parametric samples was used through the SPSS statistical program. Table (14) illustrates the results.**

**Table (14) Means, Standard Deviations, T-Values, and Significance Levels of Differences Between Pre- and Post-Measurement Scores of the Experimental Group on the Competencies Scale**

| Dimension | Measurement | Mean | Standard Deviation | T-Value | Significance Level | Eta Squared | Effect Size Interpretation |
|---|---|---|---|---|---|---|---|
| Cognitive Competencies | Pre-Test | 87.87 | 3.89 | 23.31 | Significant at 0.05 | 0.925 | Large |
| | Post-Test | 105.47 | 2.56 | | | | |
| Emotional Competencies | Pre-Test | 76.20 | 4.90 | 21.71 | Significant at 0.05 | 0.915 | Large |
| | Post-Test | 96.71 | 3.17 | | | | |
| Leadership Competencies | Pre-Test | 86.11 | 3.80 | 23.36 | Significant at 0.05 | 0.925 | Large |
| | Post-Test | 104.71 | 2.98 | | | | |
| Total | Pre-Test | 250.18 | 12.59 | 22.74 | Significant at 0.05 | 0.922 | Large |
| | Post-Test | 306.89 | 8.71 | | | | |

**The results indicate that there were statistically significant differences between the mean scores of students in the experimental group in the pre- and post-measurement of the competencies scale, favoring the experimental group in the post-measurement at the 0.05 significance level. This can be explained in light of the content of the training sessions on developing various sub-competencies as follows:**

**The effect size (Eta squared) for the scores of the experimental group students in the pre- and post-measurement of the competencies scale ranged between 0.915 and 0.925, which are large values confirming the effectiveness of the training program in developing the competencies of Arab adolescents in general and student-teachers in particular, as they are an example of university students. Despite the efforts made to prepare student-teachers who meet the needs of the labor market within faculties of education, the societal changes around us are characterized by rapid speed, which necessitates focusing on different competencies through training programs that complement the scientific content provided within different faculties of education.**

**The fifth hypothesis:**

**To verify the validity of the hypothesis that states "There are no statistically significant differences between the mean scores of students in the experimental group in the post- and follow-up measurement of the competencies scale," a paired samples t-test for parametric samples was used through the SPSS statistical program. Table (15) illustrates the results.**

**Table (15) Means, Standard Deviations, T-Values, and Significance Levels of Differences Between Post- and Follow-Up Measurement Scores of the Experimental Group on the Competencies Scale**

| Dimension | Measurement | N | Mean | Standard Deviation | T-Value | Significance Level |
|---|---|---|---|---|---|---|
| Cognitive Competencies | Post-Test | 45 | 105.47 | 2.56 | 0.814 | Not Significant at 0.05 |
| | Follow-Up | 45 | | | | |
| Emotional Competencies | Post-Test | 45 | 96.71 | 3.17 | 1.05 | Not Significant at 0.05 |
| | Follow-Up | 45 | | | | |
| Leadership Competencies | Post-Test | 45 | 104.71 | 2.98 | 1.03 | Not Significant at 0.05 |
| | Follow-Up | 45 | | | | |
| Total | Post-Test | 45 | 306.89 | 8.71 | 0.978 | Not Significant at 0.05 |
| | Follow-Up | 45 | | | | |

**Table (15) shows the following:**

- **There are no statistically significant differences between the mean scores of students in the experimental group in the post- and follow-up measurement of the competencies scale at the 0.05 significance level. These results and the continued impact of the program can be explained in light of the effectiveness of the training program, which was implemented on the experimental group to develop their competencies (cognitive, affective, and leadership). Even after a**

**month of completing the sessions, the participants maintained the different competencies they had gained.**

- **We can say that the training program has achieved its desired results. The various competencies of the target research sample have been developed, and the improvement continued even after a month of completing the training program. This confirms the achievement of the principle of continuity, one of the most important aspects of sustainable development, upon which the training program was built.**

**Study Conclusion:**

- **The study unequivocally demonstrates the efficacy of the proposed training program in fostering cognitive, affective, and leadership competencies among university students. The significant improvements observed in the experimental group, which persisted even after a month, underscore the program's potential to create lasting change. These findings highlight the critical role of targeted interventions in equipping young people with the skills necessary to navigate the complexities of the 21st century and actively contribute to the realization of the Sustainable Development Goals. The study's implications extend beyond the individual level, suggesting that integrating such programs into educational systems could have a transformative impact on Arab societies, fostering a generation of empowered, resilient, and responsible citizens capable of driving sustainable development in the region.**

## Study Recommendations:

- **Incorporate a personality development course starting from early childhood and continuing until the end of secondary education.**
- **Adopt the principle of lifelong learning based on project-based learning and the development of skills and competencies in line with global changes.**
- **Conduct training courses similar to those for teachers in the Arab world to equip them with the practical application of sustainable development standards and build the personality of effective university students in society.**

## Study Limitations:

**While this study provides valuable insights into the development of cognitive, affective, and leadership competencies among university students within the framework of sustainable development, several limitations should be acknowledged to contextualize the findings and guide future research.**

1. **Sample Characteristics and Generalizability:**
   **The study sample was limited to undergraduate psychology students from a single Egyptian university. This homogeneity may introduce selection bias, as psychology students might already possess a heightened awareness of emotional and cognitive development compared to students from other disciplines. Consequently, the generalizability of the findings to broader adolescent populations, including those from different academic backgrounds, socioeconomic statuses, or cultural contexts, is limited.**
2. **Short Follow-Up Duration:**
   **Although the study incorporated a follow-up assessment one month after the intervention, this duration may not be sufficient to fully evaluate the long-term retention and practical application of the acquired competencies. Sustainable development competencies, particularly leadership and affective skills, often require extended periods to manifest in real-world settings. Longer-term longitudinal studies are recommended to assess the durability and real-life impact of such training programs.**
3. **Reliance on Self-Reported Measures:**
   **The primary data collection tool was a self-reported competencies scale. While validated and reliable, self-report instruments are inherently subject to biases such as social desirability, response style tendencies, and participants' subjective interpretations of items. These factors may have influenced the accuracy of the reported competency levels, particularly in domains like leadership and affective competencies where self-perception can vary significantly.**
4. **Lack of Behavioral or Performance-Based Assessments:**
   **The study did not include objective behavioral assessments or third-party evaluations (e.g., peer, instructor, or observer ratings) to corroborate self-reported improvements. Incorporating such measures in future research could provide a more comprehensive evaluation of competency development.**
5. **Cultural Context Specificity:**
   **While the program was designed to be culturally adaptable across Arab societies, this study was conducted within a specific national and institutional context. Variations in educational systems, cultural norms, and societal expectations across different Arab countries may influence both the implementation and outcomes of similar programs elsewhere.**
6. **Potential Hawthorne Effect:**

**Participants in the experimental group may have demonstrated improved competencies partly due to increased attention and engagement associated with participation in a structured program, rather than solely due to the program content itself. Future studies could mitigate this by incorporating active control groups receiving alternative interventions.**

## Suggested Research:

- **Effectiveness of a training program to develop the competencies of Arab children in light of future jobs.**
- **Effectiveness of a positive thinking program to develop the competencies of Arab adolescents.**
- **A study of competency development through the use of artificial intelligence applications.**

## Conflict of interests:

**The authors declare no competing interests.**

**Ethical Approval:**

**The research was approved by the Ethics Committee - FOAH (collective decision). All research activities were conducted in accordance with relevant guidelines and regulations, including the Declaration of Helsinki.**

**Informed Consent:**

**Prior to participating in the study, all participants and/or their legal guardians provided informed consent. The consent form comprehensively detailed the nature and purpose of the research, the study procedures, potential risks and benefits, the right to withdraw at any time, and the measures taken to ensure participant confidentiality.**

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