



The level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development in their point of view

Rahbar Masood Abdulkhaleq Waad Muhammad Najat Sabry
Department of General Science, Department of Physics, College of Education
College of Basic Education.

Rahbarmasud8@gmail.com Waad.najat@su.edu.krd

Abstract

The study aimed to know the level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development, and to know their differences according to the variable of gender and scientific specialization. The researcher used the descriptive analytical method in the study; the research participants included science teachers (chemistry, physics and biology), and their number (383) chemistry, (388) physics and (394) biology in the city center of Erbil for the academic year 2021-2022. In order to reach the goals of the study, the researcher tried to build a questionnaire in (Training of Science Teacher) that consists of (52) items, after making sure of the reliability of it (0.915), the researcher applied it on the members of sample that consisted of (130) teachers of both gender, including (35) chemistry, (45) physics and (50) biology. After collecting and analyzing data through statistical program (SPSS), the researcher reached this conclusion; the training programs in Central Education in the city of Erbil have achieved the goals of teaching sciences in the light of sustainable development to medium level, male teachers in all its specialization are more oriented towards achieving training programs for goals of science teaching in the light of sustainable development than their male teachers, physics teachers are more



oriented towards achieving training programs for goals of science teaching in the light of sustainable development than chemistry and biology teachers.

Keywords: Training programs, goals of Teaching sciences, Sustainable development

مستوى تحقيق البرامج التدريبية لأهداف تدريس العلوم في ضوء أبعاد التنمية المستدامة من وجهة نظرهم

رهبر مسعود عبدالخالق وعد محمد نجات صبري

قسم علوم العامة، كلية التربية الأساس قسم الفيزياء، كلية التربية

Waad.najat@su.edu.krd Rahbarmasud8@gmail.com

المخلص

هدف الدراسة الى معرفة مستوى تحقيق البرامج التدريبية لمدرسي العلوم في تحقيق أهداف تدريس العلوم في ضوء التنمية المستدامة ف، و معرفة فروقاتهم حسب متغير الجنس والتخصص العلمي. استخدم الباحث المنهج الوصفي التحليلي في الدراسة، تضمن المشاركون (مجتمع البحث) في البحث مدرسي العلوم (كيمياء، فيزياء و أحياء) في مركز محافظة أربيل (مديرية التربية المركزية)، وعددهم (٣٨٣) كيمياء، (٣٨٨) فيزياء و (٣٩٤) أحياء لعام الدراسي ٢٠٢١-٢٠٢٢. و للوصول الى أهداف الدراسة، حاول الباحث بناء استبانة في (تدريب مدرسي العلوم) المكونة من (٥٢) فقرة الموزعة على ست أبعاد، و بعد التأكد من ثباتها و صدقها بدرجة (٠,٩١٥) وهي درجة كبيرة، طبقتها على أفراد عينة الاساسية المكونة من (١٣٠) مدرسي العلوم (٣٥) كيمياء، (٤٥) فيزياء و (٥٠) أحياء. و بعد عملية جمع المعلومات و تحليل الاحصائي ببرنامج (SPSS)، وصل الباحث الى هذه النتيجة: حققت البرامج التدريبية في مديرية التربية المركزية في أربيل أهداف تدريس العلوم في ضوء التنمية المستدامة بدرجة متوسطة، مدرسات العلوم بكل تخصصاته أكثر توجهها نحو تحقيق البرامج التدريبية لأهداف تدريس العلوم على وفق التنمية المستدامة، مدرسي الفيزياء

أكثر توجهها نحو تحقيق البرامج التدريبية لأهداف تدريس العلوم على وفق التنمية المستدامة

الكلمات المفتاحية: برامج التدريب، أهداف تدريس العلوم، التنمية المستدامة



Chapter One Preliminaries

In old days and nowadays it is always been education's priority to build Human Beings, and improving their capabilities to have enough strength to become inventors, therefore it is a huge responsibility and duty to accomplish. It ensures there are strong relationships between teaching and human development. The major role of training and exercises in education process is a main technical principle. Teaching elements are main objects to learner's success in learning and self-developing, but we still need an alternative ways, objects, and models to make a successful education process (Shahrani and Ghanam, 1993).

Twenty first century is full of challenges, and the best thing is finding new ways in work for individuals in the society, so they can have suitable life style, despite their different religion, race, desire, and wishes. It makes different sources of neither living, nor impact on next generation (Ambusahidy, 2018).

With developing education's ideas in modes and teaching methods, exercising and training teachers, and preparing them to this job. Sustainable development has two sides, "development" as source of changing, as well process of teaching and learning wants to make a positive change in student's behaviors. When we say ("sustainable" we mean time, because education and changing need time, and each of them are influential to make suitable area for students (Muhammad said, 2013).

Teaching and learning processes are known as one of the most complicated educational phenomenon that aims to achieve its own purposes and means. It tries to reach this process to the (learner), so she/he achieves its own development from their various characteristics. Therefore, main aim in education process is to make positive crucial changes in student's behaviors that are why it is important to build teaching and learning processes on those crucial manners. And changes are, to collect basic information with student's main information that already have, and teaching them so they can be proficient in any area of education processes. Although (aims of teaching) is a main object in teaching program. And it has its own value in educational researches (Al-yusry, 2012).



Although with all those challenges and differences, sustainable development is very important in the international worldwide, in result of environmental crisis, nature's pollution, poverty, increasing population, health problems, new disease, and all these crisis become obstacles in sustainable development for individuals and society. Some countries are under the threat of these crisis, that's why in some countries they try to hold conferences to solve those problems under the root, and the best and most suitable sector to solve these problems is education process And teaching (Ambusahidy, 2018).

Sustainable development process is continues interaction in main three sectors (economic, social, and environmental) and these are three main modes in sustainable development. Economic modes ensure economic growth, farther more to increase yearly income of individuals and state. Social modes ensures social education in income distribution, natural resources, suitable society to live in, because today's one of the world wide issues is injustice, cruelty, and closed minded society faces twenty first century. Environmental modes ensures protecting nature in all cost, and awareness from all environmental crisis that faces the earth, causes to death of different animals and damages universe's balance, it is because of interfering continuously in nature's environment (Smaqaiy, 2018).

Scientific education process has a lot of factors, scientific education experts inform us those teachers and tutors have their main role in building education process, and key to success in learning and teaching processes. The best teaching programs are books, activities, and schools, but they can't accomplish their aims if teachers and tutors aren't prepared in best ways with their knowledge, activities, guiding to the right way, and reflection in student's behaviors. Interaction and development in student's building personality, so they can think, understand, and develop in mind capacities to think out the box. If we decide to select all imperfections and weaknesses in teaching program, activities, and books, then teachers and tutors can fill these gaps (Zaytoon, 1989).



Teachers are the most important role models in teaching process; they can achieve education goals in the society. Skill, knowledge, experience, and expert are main characteristics in teachers and leads to success, and these are education's signs to evacuate teachers (Barakat, 2010).

Teachers are count as role models to transfer information and knowledge to improve methods and modes in education process, it lead to inventing new technics and strategies and this is the best way to achieve their aims. It needs creative programs with training and exercises so teachers being well prepared to accomplish their purposes (Al-sahidy, 2021).

The world tries to reconnect all education and learning areas, and sustainable development, and for that they hold many Conferences and different researches in this area, especially United States of America's Conferences in 2014, 2015, 2016, 2017, and the last one in 2018, in Cairo capital of Egypt. And it all leads to one point; teacher must be well prepared and known with teaching programs, exercises, training, and world sustainable development process, and to be well known with modes, principles, factors, ways of teaching and programs in education.

The statement of the problem

The researcher already have noticed that in Arabic nations and international community ensure importance of role and strategies of teaching and learning education, also trying to improve and develop teaching system in different directions and dimensions. So their elements suits with their modern era. Walking in the straight line with developed science and developed technology, it can't be accomplished only with aid of teachers, and learners, therefore we need fully completed program to progress. It aims to preparing different experts as a need to become strategies and crucial purpose in education process to answer new theories, and worldwide programs as sustainable development. Sustainable development program is a united nation's program till they can progress and develop to achieve its aims and teaching philosophies. Subjective theory of researcher in teaching programs



and preparing science teachers (chemistry, physics, and biology) in ministry of education in Erbil, as my background acknowledgement with three years of experience in training courses and studying literary exercises and education courses and teacher's opinion in participating in these courses. They felt their aims and their course's aim, so they can compare scientific expert supervisor and subject teachers of (chemistry, physics, and biology) who participated in this course, with their classic and traditional performance in highest state of presenting their acknowledgement to the lowest state in their (practice, understanding, and knowledge). In Kurdistan region, it follows direct and strategies of worldwide education in the most developed system that students can get benefit of it, according (cognitive, affective, and skilled) to be on the top. In sustainable development it cooperate teachers to achieve their best process of education. According to scientific ambitious, researcher wanted to point in the fact of training teachers program in the light of sustainable development and its aims. Therefore here is a question: what is the level of training programs achieving for the goals of teaching sciences in the light of the dimensions of sustainable development?

Significance of the Study

There are at least several significances of this study, such as follows:

- Producing special educational knowledge for training programs, and Suitable with principles and basics in training programs.
- Enhancing knowledge with sustainable development in educational sectors and their role in solving society's issues, and today's world.
- Educational authorities in training centers should introduce the significance of training program in all educational fields.
- Educational experts and supervisors have lion's share in getting a sustainable development in the all public educational sectors.

Objectives of the Study

The main and central goal of this research is to know the level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development according to the variables gender



(male and female) and scientific specialization (chemistry, physics, and biology)?

Questions of the Study

This research tries to reach answer this question: what is level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development according to the variables gender (male and female) and scientific specialization (chemistry, physics, and biology)?

The scope of the study

- Humanitarian limit: science teachers both gender (chemistry, physics, and biology) Subjects.
- Place Limit: public schools in Erbil governorate in Kurdistan Region- Iraq.
- Time Limit: the academic year 2021-2022.
- Objective Limit: training programs, science teachers and sustainable development.

Definitions of Key Terms and Operational Definitions

1. Training Program: there are various definitions of it, such as:

- According to Kraiger (2017), “*training program is the systematic process initiated by the organization that facilitates relatively permanent changes in the knowledge, skills, or affect/attitudes of organizational members*” (Kraiger, 2017: 1).
- According to the definition provided by Bhasin (2020) “*an activity or activities that include undertaking one or a series of courses to boost performance, productivity, skills, and knowledge*” (first paragrapg) (Bhasin, 2020: 1).

2. Goals of Teaching Sciences:

- According to Al-alawan (2009) “*It is the outcome of cognitive, affective, or skilled learning resulting from teaching a specific unit or subject*” (Al-alawan, 2009: 67).



- According to Al-raby (2008) “*It is a description of behavioral expectations that are expected to occur in the learner's personality as a result of his activities, or his passing through a certain educational experience or situation*” (Al raby, 2008: 36).

3. Sustainable Development:

- According to a report by UN General Assembly (1987) “*developing that meets the needs of the present without compromising the ability of future generation to meet their own needs*” (UN General assembly, 1987: 43).
- According to Halawa & Salih (2010) “*The activity that leads to the advancement of social welfare, while taking care of the available natural resources and with the least possible harm to the environment*” (Halawa & Salih, 2010: 133).

Chapter Two

Literature Review

First Field: Training Programs

Jones (2006) stated that training is the most significant human activities in all fields of life either in multi-ethnic organizations or in the official governmental sectors such as educational organizations or the healthcare centers. If we have a look at this statement which has been stated by Jones, it shows the importance of training in order to help different kind people in different fields to get the main goals that these organizations were based on.

Training and professional development are very important for every organization, especially in the field of education. Educational cadre training refers to the process of acquiring the essential skills that a particular job (teaching) requires. The aim is achieving specific goals, e.g. understanding how a particular method works, to make it suitable with the desire of students. Career development, on the other hand, places emphasis on general skills, which are applicable in a wide range of different situations.



It relates to decision making, creative thinking and managing students (Mihailović & Ristić, 2009).

The concept of training is usually mixed with the concept of development. Employee (educational characters) development implies creation of learning opportunities in order to help employees succeed in their own personal development. Employee development opportunities are not limited to the workplace where employees work (Sultana et al., 2012).

The Importance of Training

There are a number of benefits and significances of training, we can number some of them such as following:

- Removing weak points of teaching methods of teachers and converting to strong points.
- Solving the problems of the quality of doing learning process by teachers and to improve them to have an effective decision.
- To assist teachers for renewing those knowledge, which they need and with new education, are possible for new knowledge (Al-jarrah, 2008: 30-31).
- To develop methods of leadership and administrative decision.
- Training is one of the considerable factor and important source for accounting skillful, expert people which mean to succeed the process.
- Training inspires the teachers to have a great motivation to feel full responsibility without necessitating supervising them.
- Training is helpful to use new technology in general and learning with technology in particular, hence, it causes to a better education (Al-khawly, 2015: 23-24).
- It is helpful to grow sciences and teaching methods.
- To develop educational programs.
- To develop educational theories.
- It leads to change traditional methods and to develop new methods of learning and teaching.



- New training programs create a novel role for teachers and to get them away from their old-fashioned role (Dessler, 2015).

Goals of training

There are too much important goals of training; some of them can be numbering here, as following:

- To improve trainees through knowledge, skill and competency, which necessitate scientifically by the basic practices of different learning and various methods of tutorial?
- To develop proficiency and to evaluate various sources of learning by applying different ways of evaluation.
- To improve the sense of creativity amongst trainees and to motivate them to create new ways of learning.
- To develop teachers by means of learning with technology and linking them with teaching (Mahmood, 2006: 13-14).
- Growing the capability of teacher for analyzing the contents of program.
- To develop the proficiency of teacher by means of modern ways of training and performing educational study.
- To Specialize teachers by modern educational attitude of leaning and improving the sense of cooperative working and creativity.
- To renew knowledge and ability of teachers.
- To develop proficiency of thinking by contemplative thinking of trainees through doing research and training courses.
- Making opportunity for trainees to understand the relationship between theory and practice in education (Michael & Rodney, 2009).

The Successful Keys of Training Programs

- The clear goal of training program: It appears when the goal reflects on the behavior and professionally of trainees.
- To motivate trainees: to convince them in order to value the training program, which leads to response requirements through knowledge and experience.
- The consistency of training process is this process which commences before coming to professional life and to be ongoing in life (Said Ali, 2018: 302-303).



- Trainees are desirous to have joys of learning of the program and they account that this is the treasure of developing their profession, and by this they solve their problems.
- Testing trainers and trainees: Trainers have to be tested on the bases of the training program for how they have pieces of information and experiences regarding materials and ways and means of teaching. And trainees also should be tested on account of their requirements.
- Providing a possible training environment is to avail all the needful factors of training program (Al-najjar, ٢٠١١).

Second Field: Goals of Teaching Sciences

Education literary in teaching sciences is trying to achieve the following goals:

First: Helping students to acquire scientific knowledge

Scientific knowledge is really pivotal and vital in term of teaching science. It plays an important role in scientific evolution or it has been considered as fundamental and cornerstone to establish scientific building (Zaytoon, 2001: 76)

Second: Helping student to developing his/her scientific thinking

Educators in the scientific fields emphasize that one of the most important goal of teaching science is how to teach students think scientifically, not about teaching them how to memorize books and scientific programs without comprehension and perception or practically using in their daily lives (Zaytoon, 2001:94)

Third: Helping students to acquire science processes

Educators confirms in science education that the students acquire the processes of science must be an essential goal for the teaching of science, Science processes commensurate with the methods of science in research and scientific thinking (Baker & Michael, 1991).

Fourth: Helping students to acquire appropriate practical skills

It represents helping students to acquire the appropriate practical skills, conducting practical and laboratory experiments and scientific activities (Al-hitry, 2014: 12).

Fifth: Helping students to acquire developing scientific trends



Experts, science educators and teachers of science teaching see building scientific trends and its development among students is one of the main objectives of the teaching of science (Zaytoon, 2001: 109).

Each one of (Mazin, 2008: 24), (Sbitan, 2010: 10) and (Ataallah, 2001: 126-192) refer to many goals that can be achieving through teaching sciences and these goals are:

1. Deepening faith in the Creator by watching the universe and worlds of creatures in addition to their components in the one hand. On the other hand, discovering natural laws that govern on the universe and creature's lives.
2. Familiarity with scientific facts and concepts in a professional way in order to study sciences become a way to understand the environment and the spirit age our age to reach the latest discoveries of science according to the level of learner's growth.
3. Represents appropriate scientific values and trends in a professional and functional way, such as: scientific honesty, respect the opinions of others, objectivity, discarding the ideas that came from superstition thinking, respecting manual labor, curiosity, slowness in making judgments, linking cause to results, and scientific accuracy.
4. Acquiring practical scientific skills in a professional way, such as: trading and maintaining scientific tools and equipment, collecting samples from environment, using natural and environmental materials to make new tools and simple scientific devices.
5. Forming scientific trends and habits of sound thinking, in addition to form scientific inclination in a functional way, such as: scientific reading, experimentation, manual working, curiosity, to make simple scientific tools and alternatives, visiting scientific places, and carrying out purposeful scientific trips.
6. Knowing scientific attempts historically in the past by Muslim scientists and priding of them.

Third Field: sustainable development

The Concept of sustainable development

Sustainable development (SD) is a very popular, most used and common term, one of the widely used in scientific literature and research, legal acts



as well as strategic and important documents. Although at first glance the concept might seem to be quite comprehensible, a specific definition and interpretation of the term has provoked broad and serious debate among theoreticians and thinkers as well as practitioners (Boons et al., 2013, Gong et al., 2018; Mikušová, 2017).

The terms sustainability and sustainable development have been embraced by big business, governments, educational activities, authors or social reformers and environmental activists, all of which put their own interpretation on what these concepts mean (Busłowska, 2014; Sutopo, et al., 2018).

The most universal and synthetic approach to sustainable development describes it in terms of uniting goals related to economic strength, ecologic soundness and social acceptability even international and politics (Barbier, 2016; Zielińska, 2011). SD is a compromise between environmental, economic and social goals which constitute the welfare of the contemporary and future generations. The economic aspect indicates not only the Satisfaction of present needs, but also securing resources required for needs of future generations (natural, material, intellectual and social capital). The ecologic aspect means the establishment of borders of ecologic environment for human activity which should not be crossed. The social aspect is identified with education and an ability to resolve fundamental social issues, as well as participation by all in the development processes of the whole system (Ciegis et al., 2009a; Cyrek & Fura, 2019; Marková et al., 2017; Škare et al., 2013).

This concept has been defined by researchers and organizations at several levels, such as the following:

- Definition of Runks House, US Director of Environmental Protection: the process of achieving economic growth that is consistent with the capabilities of the environment, that is, the existence of a complementary relationship between economic growth and the capabilities of the environment for growth (Alhity, 2009: 14).
- Definition of Edward Barbier, who was the first to use the term of sustainable development: it is economic activities that enhance social



welfare due to available natural resources without harming the environment (Abdulkhaliq, ١٩٩٨: 242).

• Definition of UNESCO: every generation has the right to enjoy resources such as water, clean and unpolluted soil, and not to harm any living thing on earth to avoid extinction and annihilation (Al-nujaify et al., ٢٠١٢: 15).

Goals and dimensions of sustainable development

First, economic goals (Dimension)

- Renewal and change in economic growth in terms of quality and quantity.
- Reduce pressure on the use of natural resources.
- Overcoming poverty and hunger and provision of services.
- Increase production to keep pace with prices and population growth.
- Use of energy and natural resources that do not cause environmental pollution.
- Provision of water, food, health, education and employment systems (Our common future, 1987, 115).

Second, social goals (Dimension)

- Living together despite cultural and civilizational differences.
- Participation of individuals in cultural, social and political activities.
- Fair distribution of natural resources and income and equal employment.
- Participation of citizens in decision-making and shaping the political system.
- Preserving cultural identity and increasing social awareness.
- Awareness of institutions (Al-rubaihy, 2004: 124).

Third, environmental goals (Dimension)

- Regulate biological production and protect the environment.
- Spread health awareness and how to deal with diseases and treatment methods.
- Provide medicines and vaccines against viruses and bacteria.
- Protect biodiversity and ecosystems.
- Improve environmental capacity in the use of natural resources (Ghanaim, 2001: 4), (Ministry of Planning, 2017, 6-11).

Strategies of Sustainable development



- The need for change in the idea of development: practicing development strategies to be suitable with the environment to increase the resources and raise the level of human development.
- Warning people about the importance of continuous development in all aspects of life.
- The need to set up a work program by the state that will be combined with humanitarian, financial and administrative capabilities.
- Use modern technology and organize resources in an ideal way.
- Monitoring, evaluating and pursuing continuous development through some clear references to different social, economic and environmental dimensions (Abuali, ٢٠١١):52).

Previous Studies

First: previous studies that dealt with training programs

- The study “Effectiveness of training programs for physical education teachers during the service” by (Al-Ananza, 2015) aimed to know the discovery of the effectiveness of training programs for physical education teachers during the service, in order to reach the goal of the study, the two researchers has used a questionnaire to collect information, after making sure of the reliability and face validity of it, the two researchers applied on the samples of research that included 80 teachers (male, female), he reached this conclusion: effectiveness of training programs for physical education teachers during the service was in the middle period on all areas and numbers as a whole.

Second: previous studies that dealt with goals of teaching sciences

The study “The role of physical education teachers in achieving educational goals” by (Hudat, 2017)) aimed to identify the role of physical education teachers in achieving educational goals from the teacher’s point of view, in order to reach the goal of the study, the researchers has used a questionnaire to collect information, after making sure of the reliability, content and face validity it, the researchers applied on the samples of research that included 170 teachers (male, female), he reached this conclusion: The role of physical education teachers in achieving educational goals was great (high).



Third: previous studies that dealt with sustainable development

- The study “ A proposed program in light of the dimensions of sustainable development and the green economy and its impact on the development of sustainable thinking, cognitive balance and sustainable trends by students of scientific department of the College of Education” by (Muhammad, 2022) aimed to get knowledge about a proposed program in light of the dimensions of sustainable development and the green economy and its impact on the development of sustainable thinking, cognitive balance and sustainable trends by students of scientific department of the College of Education, in order to reach the goal of the study, the researchers has used a questionnaire and test to collect information, after making sure of the face and content validity and internal consistency of it, the researcher applied on the samples of research that included 30 students (male and female) from subjects of (chemistry, physics and biology), he reached this conclusion: The students of the research group excelled in the post application over pre application with a statistically significant difference at the 0.01 level in terms of acquiring some concepts related to the green economy and cognitive balance, the students of the research group excelled in the post application over pre application with a statistically significant difference at the 0.01 level in terms of developing sustainable thinking and sustainable trends.

Chapter Three

Methodology

1. **Research Method:** to accomplish goals of the current research, descriptive analytic survey was used to find out the (The level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development).
2. **Research Participants:** it is represented in the current research (Science teachers in the center of Erbil Governorate who contributed in training courses). The population is (1165) Male/Female instructors (Chemistry,



Physics, Biology) in high schools, (394) teachers of biology, (383) teachers of chemistry and (388) teachers of physics.

3. **Sample of Research:** random method was used among science teachers, (50) biology, (45) chemistry and (35) physics, in some of the state schools in the center of Erbil Governorate, (76) of them are male teacher and (54) of them are female teachers.
4. **Research Tool:** the researcher relied on the following steps to build the questionnaire (training of science teachers) of the current study to be applied to the basic sample members:
 - a) **Determining the goal:** to measure (The level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development).
 - b) **Reading and reviewing previous studies and educational literature** that related to the current research in order to determine the (dimensions) and formulating (items) of the questionnaire (science teacher training) that achieve the goal of this research.
 - c) After reading and reviewing the literature and previous studies, the researcher applied the **open questionnaire** to a group of experts, eventually, he has reached to identify six dimensions (cognitive, affective, skilled, social, environment, and economical) and (60) items that distributed on the six dimensions, as shown in table (1):

<i>Dimensions</i>	<i>Items</i>
<i>Cognitive</i>	<i>10 items</i>
<i>Affective</i>	<i>10 items</i>
<i>Psychomotor</i>	<i>12 items</i>
<i>Social</i>	<i>10 items</i>
<i>environment</i>	<i>10 items</i>
<i>Economical</i>	<i>8 items</i>

Table (1)

It shows items are divided into six areas:



- d) Face validity:** The items of the questionnaire (training of science teachers) were presented to (25) experts to express their opinions, and after analyzing the items, they are agreed to use Cooper Equation to analyze the validity or invalidity of the questionnaire, and according to the procedure, it is agreed to remain (60) items after modification of some items in terms of paraphrasing and linguistic comments.
- e) Instructions:** the current research designed with a Likert Scale for (training science teachers), teachers are required to response through one alternative among the triple Likert Scale that starts from maximum (High=3) and the second alternative is the average (Medium=2) and the last alternative, Minimum (Low=1).
- f) Discriminatory Power:** the researcher applied the exploratory sample that consisted of (100) male/female teachers at state schools in the center of Erbil Governorate to comprehend the clarification of the items and the instructions of the questionnaire by the teachers when responded, After collecting, analyzing, and arranging the data they are arranged in descending order and considering a rate of (27%) of higher and lower group as per (27) individual for each group. Then a t-test was implemented for two independent samples, all the items were statistically significant except for the item of (7, 18, 22, 35, 45, 47, and 56), the data indicated that the value of the t-test is less than the tabular at the level of (0.05) and degrees of freedom (53), therefore these items are excluded from the psychometric properties.
- g) The validity of the internal consistency and the relationship of the items to the dimensions and the scale:** To achieve this, the researcher extracted the mean and the standard deviation of each item according to the dimensions and according to the scales. Pearson calculation is implemented, the value of Pearson correlation that calculated between each item and its dimension as well as each item and the scale was greater than the tabular Pearson correlation at the level of (0.05) and reliable (98). Therefore, it is found that the items and the scale within the dimension are significant except item (39).



h) Utilizing Alpha Cronbach method for the reliability of the questionnaire: the value of Alpha Cronbach coefficient is (0.915).

5. **Application of research tool:** after the researcher chose members of the sample from science teachers (chemistry, physics, and biology), as well as the researcher's preparation of his tool and verifying its psychometric properties, validity and reliability, then, researcher applied the tool by himself with participating some of his colleagues in the same specialty, as the researcher and his other colleagues were explaining to the members of the research sample, the aim was to supervise the process of taking information from members through the questionnaire and their responses. This process continued from (10-1-2022) to (20-1-2022).

6. **Statistical tools:** The researcher analyzed the results of his research by using the statistical package SPSS and the following statistical means:

- T- test: for two independent samples to extract the discriminatory power of the items of the questionnaire (training of science teachers).
- Person Product-Moment Correlation: to find the correlation between the score of each item and the total score for the purposes of analyzing items and measuring them, meaning the reliability of the questionnaire (science teacher training) between the first and second applications and finding the relationship between them.
- T-test for correlation coefficient: to check the statistical significance of the correlation coefficient.
- T- value: to extract the significance of the Pearson correlation coefficient.
- Alpha Cronbach coefficient: to check the reliability of the tool, at the same time is called internal consistency coefficient to measure the reliability.
- t-test One Sample: to test the significance of the difference between the mean scores of the sample on the questionnaire and its hypothetical mean.
- Cooper Coefficient: to make correspondence and extract the reliability of questionnaire.
- Scheffe test: to find out the least statistically significant difference between specializations in the research basic sample.



Results and discussion

In this part, I will present and discuss result of the research in light of its goals; then, we will try to show conclusion and recommendation, as follows: The question of the research was what is the level of achievement of training programs for the goals of teaching sciences in the light of the dimensions of sustainable development according to the gender (male and female) variable and scientific specialization (chemistry, physics, and biology) variable? To achieve this goal, researcher extracted the arithmetic means, standard deviations and the ordinal scale for each of the six dimensions in the two variables as it obvious in table number (2):

Table (2)

This table shows us the arithmetic means and standard deviations to the level of achieving training programs for the goals of teaching science in the light of sustainable development according to the gender (male and female) variable and scientific specialization (chemistry, physics, and biology) variable

variable		infor matio n	Dimensions						Tota l
			Cogn itive	Affe ctive	Skil led	Soci al	Environ mental Health	Econ omic	
Gender	Male (٧٦)	X	١٩,٥ ٥	١٧,٧ ١	٢٢, ٨٠	١٨, ٧٤	١٥,٥٤	١٥,٥ ٧	١٠٩ ٩١.
		S	٣,٩٢ ٧	٣,٢٠ ٨	٣,٩ ٩٣	٢,٨ ٨٦	٣,٨٣٥	٣,٠٦ ١	١٢, ٠٧٠
	E	Medi um	Med ium	Med ium	Hig h	Mediu m	Medi um	Med ium	
	Fem ale	X	٢١,٦ ٣	١٩,٤ ٦	٢٢, ٣٧	١٩, ٣٠	١٦,٣٠	١٥,١ ٣	١١٤ ١٩.



	(٥٤)	S	٣,٦٨	٣,٢٠	٣,٢	٣,٠	٣,٥٢٢	٢,٤٥	١٢,
		E	High	Med ium	Med ium	Hig h	Mediu m	Medi um	Med ium
Special ization	Biol ogy (٥٠)	X	٢٠,١	١٨,٩	٢٢,	١٩,	١٥,٨٤	١٥,٤	١١١
		S	٦	٨	٣٢	٢٢		٠	٩٢.
	E	Medi um	Med ium	Med ium	Hig h	Low	Medi um	Med ium	
	chem istry (٤٥)	X	١٩,١	١٦,٩	٢٢,	١٨,	١٥,٢٢	١٥,٢	١٠٧
		S	٦	٣	٤٩	٦٤		٠	٦٤.
		E	Medi um	Med ium	Med ium	Med ium	Mediu m	Medi um	Med ium
physi cs (٣٥)	X	٢٢,٤	١٩,٦	٢٣,	١٩,	١٦,٦٩	١٥,٦	١١٦	
	S	٠	٠	٢٣	٠٣		٠	٥٤.	
	E	High	Med ium	Med ium	Hig h	Mediu m	Medi um	Med ium	
All	X	٢٠,٤	١٨,٤	٢٢,	١٨,	١٥,٨٥	١٥,٣	١١١	
	S	٢	٤	٦٢	٩٧		٨	٦٨.	
	E	Medi um	Med ium	Med ium	Hig h	Mediu m	Medi um	Med ium	

First of all, I must clarify these three symbols that came in the table (2):

X is a symbol for arithmetic means, **S** is a symbol for standard deviations, and **E** is a symbol for estimations.



As it shown in table (2), the general level of achieving training programs to fulfill the goals of teaching science in the light of sustainable development is recorded medium in accordance with subject (members of sample) that include gender variable (male and female) and scientific specialization variable (chemistry, physics, and biology) in addition to some simple differences in arithmetic means on the one hand, on the other hand, there are six dimensions of sustainable development in the light of achieving teaching science was measured, is recorded medium too, with exception of social dimension is recorded in a high level. The researcher sees these results depending on the training programs are still classical and stereotyped in the city of Erbil, which means training programs in the directorate of training and preparation in terms of methods, contents, techniques, strategies and practicality are still traditional, as well as their intensive focus is more on cognitive and skilled dimensions, meanwhile, the up to date (modern) teaching and learning process, is focusing more on cognitive integration and principles of sustainable development, so as to help complete the personality of the trainer and trainees will be full in all necessary multi-dimensions regarding the cognitive, affective, skilled, social, health-environmental, and economic. And from the social dimension point of view, has had the highest rank (level) among other dimensions for achieving goals of teaching science based on their perspectives, the researcher thinks that this attributes to natural interaction and the participation of both sides of teachers in the training courses, as how to share their mind and feelings, also, these are all reflected positively on achieving their goals in the these courses and these results are in straight line with Ananza (2015) research under title The effectiveness of training programs for physical education teachers during the service was recorded in middle period on all areas and numbers as a whole. On the other side of results, female teachers they have ambitious and attitude towards achieving training programs in sustainable development than male teachers. On the same context, physics teachers are more ambitious towards achieving training programs in sustainable development for goals of science teaching than chemistry and biology teachers including both genders



according to the results of the questionnaire with physics teachers the training programs are appropriate with principles of sustainable development.

Conclusion

In the light of the results of research, the researcher came up with a number of conclusions, including:

1. The training programs in Central Education in the city of Erbil have achieved the goals of teaching sciences in the light of sustainable development to medium level.
2. Male teachers in all its specialization are more oriented towards achieving training programs for goals of science teaching in the light of sustainable development than their male teachers.
3. Physics teachers are more oriented towards achieving training programs for goals of science teaching in the light of sustainable development than chemistry and biology teachers.

Recommendations

1. Reconstructing the curriculum of the courses based on modern trends, including sustainable development.
2. Sending trainers in the Directorate of Preparation and Training to countries with advanced systems to inform them of their training programs.
3. Directing the specialized supervision of science subjects by enlightening their teachers on the principles and goals of sustainable development in science teaching.

References

1. Baker, D. R. (1991). Process skills acquisition Cognitive growth and attitudes change of ninth grade student in a scientific literacy course. Journal of research in science.
2. Michael. W., & Rodney, C. (spring 1998). Why they enjoy teaching: the motivation of outstanding teaching teacher. Educational Technology, 9(2).
3. Dessler, G. (2015). Human resource management (13th Ed.). Person educator, Inc.
4. Jones, P. (2006). Training evaluation practices in large Illinois hospitals. University of Illinois at Urbana-Champaign.
5. Planning, M. o. (2017). Sustainable development goals; essential reforms. The Republic of Iraq: Central statistical organization.



6. Mihailović, D., & Ristić, S. (2009). Organizaciono ponašanje [Organizational behavior]. Belgrade: Faculty of Organizational Sciences.
7. UN General Assembly, (1987). Report of the World commission on environment and development: our common future. Oslo, Norway: • UN General Assembly, development and international Co-Operation: Environment.
8. Sultana, A., Irum, S., Ahmed, K., & Mehmood, N. (2012). Impact of training on employee performance: a study of telecommunication sector in Pakistan. *Interdisciplinary journal of contemporary research in business*, 4(6), 646-661.
9. Boons, F., Montalvo, C., Quist, J., & Wagner, M. (2013). Sustainable innovation, business models and economic performance: An overview. *Journal of Cleaner Production*, 45, 1–8. <https://doi.org/10.1016/j.jclepro.2012.08.013>
10. Gong, M., Simpson, A., Koh, L., & Tan, K. H. (2018). Inside out: The interrelationships of sustainable performance metrics and its effect on business decision making: Theory and practice. *Resources, Conservation and Recycling*, 128, 155–166. <https://doi.org/10.1016/j.resconrec.2016.11.001>
11. Mikušová, M. (2017). To be or not to be a business responsible for sustainable development? Survey from small Czech businesses. *Economic Research*, 30 (1), 1318–1338. <https://doi.org/10.1080/1331677X.2017.1355257>
12. Sutopo, B., Kot, S., Adiati, A. K., & Lina, N. (2018). Sustainability Reporting and Value Relevance of Financial Statements. *Sustainability*, 10 (3), 2–14. <https://doi.org/10.3390/su10030678>
13. Barbier, E. B. (2016). Sustainability and development. *Annual Review of Resource Economics*, 8, 261–280. <https://doi.org/10.1146/annurev-resource-100815-095227>
14. Zielińska, A. (2011). Applying Multidimensional Comparative Analysis for the Assessment of the Concept Realization of Sustainable Development for the Protected Areas. *Economics & Sociology*, 4 (1), 87–96. <https://doi.org/10.14254/2071-789X.2011/4-1/9>
15. Ciegis, R., Ramanauskiene, J., & Martinkus, B. (2009a). The Concept of Sustainable Development and Its use for Sustainability Scenarios. *Engineering Economics*, 2, 28–37.
16. Cyrek, M., & Fura, B. (2019). Employment for sustainable development: sectoral efficiencies in EU countries. *Social Indicators Research*, 143, 277–318. <https://doi.org/10.1007/s11205-018-1970-8>
17. Marková, V., Lesníková, P., Kaščáková, A., & Vinczeová, M. (2017). The present status of sustainability concept implementation by businesses in selected industries in the Slovak Republic. *E+M Economics and Management*, 20 (3), 101–117. <https://dx.doi.org/10.15240/tul/001/2017-3-007>



18. Škare, M., Kostelić, K. & Jožičić, K. (2013). Sustainability of Employee Productivity as a Presumption of Sustainable Business. Economic Research-Ekonomska Istraživanja, 26 (sup1), 311–330. <https://doi.org/10.1080/1331677X.2013.11517654>
19. Bhasin, H., (2020). What is training programs? Definition, Meaning, and Types, Marketing91, Home, Human Resources.
20. Kraiger, K. (2017). Training from an organizational psychology perspective. Oxford Research Encyclopedia of Psychology. Retrieved August 24, 2019 from <https://oxfordre.com/psychology/view/10.1093/acrefore/9780190236557.001.0001/acref-ore-9780190236557-e-33>
21. الشهراني، ع، ع، الغنام، م ع. (1993). دراسة تحليلية لبعض العوامل التربوية المؤدية الى تدني تحصيل طلاب الفيزياء كما يراها أعضاء هيئة التدريس والطلاب بقسم الفيزياء بكلية التربية بأبها. رسالة الخليج العربي ، 1314(48)، المملكة العربية السعودية، الرياض.
22. بركات، زياد. (2010). الاحتياجات التدريبيه اللازمة لمعلم الصف في المرحلة الاساسية الدنيا من وجهة نظر معلمي المدارس الحكومية بمحافظة طولكرم بفلسطين. المؤتمر العلمي الثالث لجامعة جرش الاهلية، 61-87.
23. السعيد، ع. ض. (2021). فاعلية برنامج تدريبي قائم على التنمية المستدامة لتحسين الجدارات التدريسية لمعلمي التربية الاسلامية المرحلة المتوسطة بالكويت، كلية التربية، قسم المناهج و طرق تدريس و تكنولوجيا التعليم . الكويت : جامعة كفر الشيخ.
24. زيتون، ع. م. (2001). أساليب تدريس العلوم، كلية العلوم التربوية، الجامعة الاردنية) ط. (1 الاردن.
25. الربيعي، ه. س. (2004). أثر العامل السكاني في تنمية المستدامة مع اشارة لاسيما الى بلدان الاسكوار. رسالة الماجستير، كلية الادارة والاقتصاد، جامعة بغداد.
26. العلوان، ا. ب. (2009). علم النفس التربوي تطوير المتعلمين) ط. (1 عمان الاردن: دار الحامد للنشر والتوزيع.
27. اليسري، ج. (2012). الاهداف التعليمية والادائية و علاقاتها بدافعية الانجاز لدى تلاميذ السنة الثالثة متوسط - الاخضرية، جامعة العقيد أكلي محند أولحاج. جامعة العلوم الانسانية والاجتماعية.
28. حلاوة، ج.، و صالح، ع. (2010). مدخل الى التنمية. عمان: دار الشروق للنشر والتوزيع.
29. سماقي، أ. أ. (2017). التنمية المستدامة في اقليم كردستان العراق، واقع و رؤية استشرافية (ط. (1 دار غه زمنوس للطبع والنشر.
30. غنائم، م. (2001). دمج البعد البيئي في تخطيط الإنمائي. القدس: معهد الابحاث التطبيقية.
31. أبو علي، ن. ف. (2011). التنمية المستدامة في العمارة التقليدية في المملكة العربية السعودية، رسالة ماجستير . المملكة العربية السعودية : جامعة ام القرى.
32. النجار، ع. (2011). البرامج التدريبيه و أثرها على أداء موظفي وزارة التربية والتعليم الفلسطينية في محافظة الخليل، واقع و طموحات، رسالة ماجستير. فلسطين: جامعة الخليل.
33. الهيتي، ن. ع. (2009). التنمية المستدامة، الاطار العام والتطبيقات، دولة الامارات العربية المتحدة نموذجا (ط. (1 الامارات العربية المتحدة: مركز الامارات للدراسات والبحوث الاستراتيجية.
34. النجفي، س، ت، الجلي، أ، ب. (2012) البيئة والتنمية المستدامة، مقاربات اقتصادية معاصرة. مجلة تنمية الرافدين. (73) 25،
35. عبدالخالق، ع. (1998). التنمية المستدامة والعلاقة بين البيئة والتنمية. بيروت : مركز الدراسات الوحدة العربية، سلسلة كتب المستقبل العربي. 13.



36. أمبوسعيدى, ع. ع. (2011). ادماج مفاهيم و موضوعات التربية من أجل التنمية المستدامة في الخطط التعليمية والمناهج الدراسية. مجلة التواصل, ع. 25-16, 14.
37. الجراح, هانى يوسف. (٢٠٠٨). فاعلية برنامج تدريبي لتنمية مهارات الاخاء المسرحية لدى المعلمين الممارسين للنشاط المسرحي في الاردن, قدمت هذه الاطروحة استكمالاً لمتطلبات منح و درجة الدكتوراه في فلسفة التربية, تخصص مناهج التربية المهنية و طرائق تدريسها في جامعة عمان العربية للدراسات العليا.
38. محمود, حمدي شاكر. (٢٠٠٦). مهارات التدريب, دار الاندلس للنشر والتوزيع, ط١ ٢٠٠٦, المملكة العربية السعودية.
39. الخولي, صلاح زهران. (٢٠١٥). الاتجاهات المعاصرة في نظم تدريب المعلمين, دار العلم والايمان للنشر والتوزيع, ط١ دسوق: جمهورية مصر العربية.
40. سيدعلى, أسامة محمد. (٢٠١٨). اعداد المدرب المبدع (TOT), دار العلم والايمان للنشر والتوزيع, دسوق- شارع الشركات-ميدان المحطة-بجوار البنك الاهلي المركز, ط١.
41. العتري, سعد بن سليمان بن حسين. (٢٠١٤). معوقات استخدام المختبر في تدريس مادة العلوم في الصفوف العليا بالمرحلة الابتدائية من وجهة نظر معلمي العلوم و مشرفيهم بمدينة بريدة, متطلب تكميلي لنيل درجة الماجستير في المناهج و طرق تدريس العلوم, جامعة أم القرى كلية التربية, قسم المناهج و طرق التدريس, المملكة العربية السعودية.
42. مازن, حسام محمد. (٢٠٠٨). اتجاهات حديثة في تعليم و تعلم العلوم, ط١, القاهرة: دار الفجر للنشر والتوزيع.
43. عطالله, ميشيل. (٢٠٠١). طرق وأساليب تدريس العلوم, ط١, دار المسيرة للنشر والتوزيع والطباعة, عمان.
44. سبيتان, فتحي ذياب. (٢٠١٠). أصول و طرائق تدريس العلوم, ط١, دار الجنادرية للنشر والتوزيع, عمان.