The impact of the sequential adaptive content delivery approach on the development of academic self-efficacy among educational technology students

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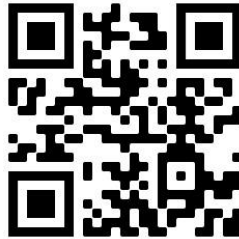
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Research Abstract:

The aim of this study was to investigate the impact of the sequential adaptive content delivery approach on the development of academic self-efficacy among educational technology students. The experimental treatment consisted of a learning environment based on the sequential adaptive content delivery approach. The measurement tools included an academic self-efficacy scale. The research experiment was conducted on a group of 30 male and female students from the second year of the Educational Technology Department, Faculty of Specific Education, Minya University. The results revealed a significant impact of the sequential adaptive content delivery approach on the development of academic self-efficacy among educational technology students. This can be attributed to the sequencing and coherence in delivering the content of academic self-efficacy and learning according to their abilities.

Keywords:

Sequential adaptive content delivery approach, academic self-efficacy, educational technology students.

Research Introduction:

Academic self-efficacy refers to learners' beliefs about their educational abilities. It is one of the methods to achieve goals and accomplish educational tasks in the learning environment. Learners with high academic self-efficacy tend to have higher academic achievement compared to low self-efficacy students. Academic self-efficacy beliefs shape learners' judgments about their abilities and serve as a motivation for their personal achievements. The perception of learners' self-efficacy is associated with educational experiences represented by teaching methods and strategies. Therefore, the method of delivering educational content in an active environment contributes to the discovery of learners' skills in achieving better levels of achievement and learning (Maidon & Mouloud, 2014, p. 108).

Adaptive content can be presented and displayed in various forms that are suitable for all learners, provided that it is easily accessible and retrievable, scientifically accurate, simple, and clear, tailored to the learners' levels. These forms include written texts, audio, images, videos, animations, navigation, screen design, and even interactive adaptation of the content to the learners' nature. It is essential to combine multiple auditory and visual means and integrate them in an interactive and comprehensive manner according to the learner's nature, learning style, and desire for learning. This approach is one of the methods of content delivery that aims to achieve learning goals (Nasr El-Din Mabrouk, 2010, p. 39), (Osama Hindawi, 2009, p. 452)

The design of adaptive content delivery methods combines the principles of cognitive, constructivist, social, and communicative theories. It organizes the elements of instructional content in a specific and clear manner, provides instructions and guidelines for learners, and represents the content clearly, avoiding excessive aesthetic additions. It integrates visual elements with other elements of the learning environment, avoids exaggeration in the colors of graphics and animations, considers learners' prior experiences, directs them towards achieving goals and objectives, and limits the role of the teacher to guidance, supervision, organization, and allowing learners to have control over their learning. It promotes collaboration and cooperation

among learners in activities to enhance their learning. The educational message should be clear, appealing to learners' interests, and suitable for their preferences and needs. The educational message should also be accurate and free from scientific errors and complexities, enabling learners' active participation.

Sense of the problem:

The sense of the research problem arises from:

- Academic self-efficacy is one of the requirements that should be focused on by academic learners at different university stages to enhance their levels of achievement and accomplishment.

- Through reviewing previous studies and literature, it is evident that there is confusion between general self-efficacy and academic self-efficacy. This research aims to clarify the distinction between general self-efficacy and academic self-efficacy.

- Previous studies recommend diversifying the methods of adaptive content delivery and presentation, such as (Earnesty et al., 2018) and (Shelle, Gwyn; Dziuban, Charles; Moskal, Patsy et al., 2018). Some studies also emphasize the importance of academic self-efficacy, such as the study by Zakaria Jabr (2017) and Sayed Ragab (2016).

- The results of administering the academic self-efficacy scale to a group of 15 second-year students from the Educational Technology department revealed that 13 students, accounting for 86.66% of the sample, demonstrated a lack of awareness regarding the significance of academic self-efficacy for learners.

Research Problem:

The current research problem can be identified as investigating the impact of the sequential adaptive content delivery style on the development of academic self-efficacy

among Educational Technology students. To address this problem, the current research aims to answer the following questions:

- What is the instructional design of the sequential adaptive content delivery style in developing academic self-efficacy among Educational Technology students؟
- What is the impact of the sequential adaptive content delivery style on the development of academic self-efficacy among Educational Technology students؟

Research objectives

The current research aims to develop academic self-efficacy among Educational Technology students through the sequential adaptive content delivery style.

Significance of the Research:

- **Theoretical Significance:**
- Directing the attention of educators towards the importance of employing adaptive content delivery styles in the educational process to develop scientific and academic skills in learners.
- Responding to the recent guidelines in the technological and educational fields regarding the importance of integrating modern technologies in the educational process to keep up with technological advancements in learning.

- **Practical Significance:**
- Guiding students in developing and appreciating their skills within the educational community.
- Enhancing academic self-efficacy among learners.
- Directing specialists towards the importance of focusing on academic self-efficacy and utilizing it to enhance learning experiences and achieve maximum benefits in the educational process.

Research Limitations:

The research is limited by the following boundaries:

1- Human sample boundaries: The main sample consists of 30 male and female students from the second year of the

Faculty of Education (Faculty of Specific Education) at Minya University who possess basic computer skills such as opening and operating programs, using the internet for tasks like registering on learning platforms, browsing content, navigating through different links, preparing and submitting activities through learning platform links. Additionally, there is an additional survey sample of 10 male and female students from the same research community but outside the main sample.

2- Content boundaries: The dimensions of the academic self-efficacy scale include self-regulated learning beliefs, achievement beliefs, motivation for achievement, self-efficacy level, generality of self-efficacy, and strength of self-efficacy.

3- Time boundaries: The research is conducted during the second semester of the academic year 2022-2023.

4- Spatial boundaries: The research is conducted in the computer labs of the Educational Technology department at the Faculty of Specific Education, Minya University, and any other location where learners are present and meet the necessary requirements for learning through an environment based on the sequential adaptive content delivery style.

The search methodology:

The current research uses the following two methods:

- Analytical descriptive approach to literature and related studies with a view to collecting data to produce a learning environment based on the successive mode of presentation of adaptive content and the selection of the academic self-efficiency measure.

- The experimental approach to suit the nature of the research, to design and produce a learning environment based on the sequential mode of presentation of adaptive content and in accordance with a well-established and concise list of criteria and to measure its impact on academic self-efficiency.

Research variables: The research variables are:

- Independent variable: The mode of presentation of adaptive content is sequential.
- Dependent variable:
    o Academic self-competence.

Semi-experimental design of research:

Current research uses the experimental design of an e-learning environment based on the sequential mode of presentation of adaptive content. The academic self-efficiency measure is applied previous ly and then learning through a learning environment based on the sequential mode of presentation of adaptive content and the dimensional application of the scale. The following figure illustrates the experimental design of the research:

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┌─────────────────┬─────────────────────┬──────────────────┐
│   Previous      │   Experimental      │   Post app .     │
│  application    │    treatment        │                  │
│       │         │        │            │        │         │
│       ▼         │        ▼            │        ▼         │
│ Academic self−  │ Learning environment│ Academic self−   │
│ efficacy measure│ based on the        │ efficacy measure │
│                 │ sequenced mode of   │                  │
│                 │ presentation of     │                  │
│                 │ adaptive content    │                  │
└─────────────────┴─────────────────────┴──────────────────┘
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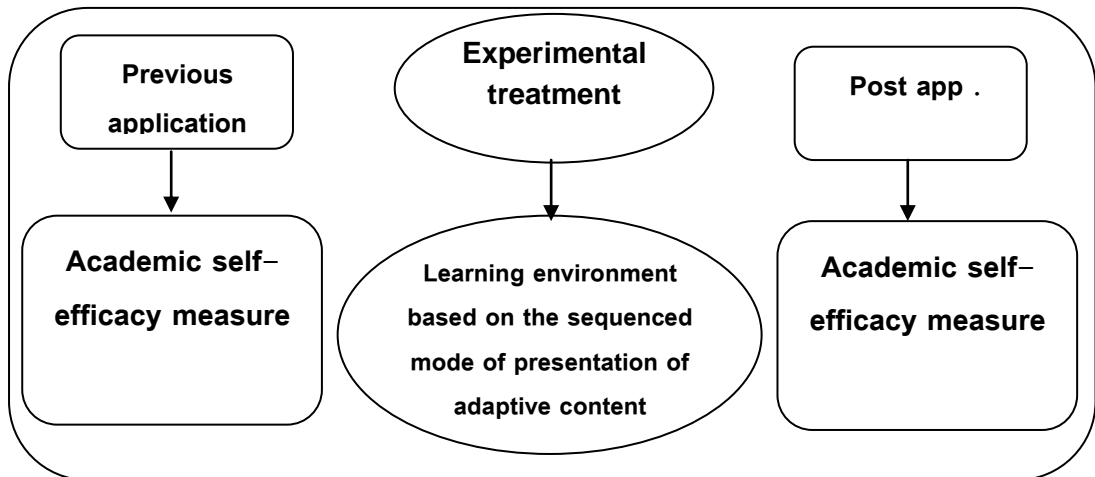
Imposition of the search

- There is a statistical difference of D at the level of 0.05 between the average student grades in the previous and Post measurements of academic self-efficiency in favor of telemetry.

Research tools:

Data collection tools (prepared by the researcher)

- List of criteria for the mode of presentation of sequential content in an adaptive learning environment.

Experimental processing material:

- Adaptive environment to provide content in sequence.

Measurement tools

− **Academic self-efficiency measure.**

Searching terms:

1- System Of Provision Of Alternative Context:

It is defined procedurally as the ways in which the educational material for academic self-sufficiency should be presented on the research sample is the form of a sequential adaptive pattern in which the content is divided into parts, each part of which has a requirement in the student model. The system shows the part that is only relevant to the student ' s needs and to which the learning requirement applies. This requirement is in the student ' s level of knowledge (starter, average, expert).

2- Academic self-efficiency:

It is the degree that a student of Educational Technology at the Faculty of Specific Education, Minya University, obtains in the academic self-efficacy scale.

Theoretical framework and previous studies:

First of all, the mode of presentation of sequential adaptation content.

Adaptation in the design of electronic content adjusts the way in which information is provided according to the learning style that characterizes each student, can progress according to his/her own abilities, obtain immediate assistance and feedback, and adaptive content is the content of a rich structure, based on multi-purpose, technologically advanced meanings appropriate to students, adapted to multiple learning needs, used in multiple settings and enabled each user to obtain the information required for his/her personal objectives.

Definition of adaptive content:

agree that the adaptive content is as follows: Tamer Al-Malha(2017, 141); Mohammad Khamis (2015,118); Hong " Dunn Dunn, 2004; " Brusilovsky& Peylo, 2001 "; " Dolog, 2003 ". ؛

− Ways, strategies and methods to modify, regulate and coordinate the quantity of information as well as the sequence of adaptation, which depends on the effective arrangement of learning elements .

- An innovative way to provide a good interactive design centred around the student, providing learning to anyone anywhere and at any time.

- contents capable of changing and modifying the manner in which they are presented according to the student method, which is determined by the learning environment prior to the start of the content.

- A learning system based on artificial intelligence, using the logic and symbolic norms of teaching and learning students and emulating that human teacher to a great extent.

- An educational system that is not only based on learning procedural facts and knowledge, but that teaches students the skills of thinking and problem solving, making them highly suitable for different learning purposes.

- A system for providing adaptive content in the light of the student ' s previous objectives, knowledge and characteristics.

- Adaptation is linked to the diverse characteristics and potential of the system.

- Learning is an individual process that differs from person to person in the way new information is responded to and processed.

- The adaptive e-learning environment can be able to monitor and interpret user activities to facilitate the learning process.

- It can be adapted to the student pattern in various ways through appropriate media, content and presentation .

- It provides access to different digital features and sources, which work alongside other forms of educational materials to provide a flexible educational environment.

Characteristics of adaptive content:

Mills, 2010, 314; Ragab, 2011, agreed that adaptive electronic content has the following characteristics:

- Adapting and adapting the level and presentation of the teaching material to the individual ' s abilities and characteristics.

- It is a source of knowledge, contributing to the student 's questions, imparting specialized knowledge to him or her, and explaining his or her performance and manner.
- The representation of knowledge is used as an artificial intelligence technology and contains multiple types of knowledge.
- Using evidence technology, the educational programme offers a solution to the problems and educational decisions associated with the subject of learning.
- Depends on scientific assumptions based on student errors and timing.
- Use learning strategies that are more appropriate to students ' learning methods.
- It uses a flexible interface based on dialogue and mutual interaction between students and educational content .

Modes of presentation of adaptive content:

It is intended to present adaptive content in different ways and by different regulations and to adapt the complex media to the student ' s objectives, knowledge and information stored in the user model, and there are several modes of display of adaptive content as indicated by: Spring of Ramud, Sayed Shaaban (2016, 13); Tsandilas (2012); it is:

1- **Replacement of content parts**: In some studies, it is also called a variety of page styles, linking a different set of pages to a particular content, meaning that adaptive media contain many different alternatives to the same content parts, and the system presents the appropriate alternative for a student according to a learning model, such as the appropriate alternative for a student of principle, medium or expert .

2- **Classification of content parts**: In some studies, the content is called the pattern of various passages, where it is presented in parts grouped according to their importance, starting with the most important and ending with the least significant, according to some criteria based on the different characteristics of students.

3- **The content parts are blacked out**: those parts of the content

that are less important to the student are now blacked out by making those parts faint or unclear .

4- **Alteration of the size of visual elements**: This pattern depends on changing the size of the web pages by reducing the volume of the text presented and less relevant to the student, i.e., the context of learning is visible but smaller.

5- **Flexible content (total)**: provides an additional explanation linked to the subject of learning, which is one of the types of supertext that can be extended or reduced through pressure on active links, based on the student model.

6- **Content (sequential)**: The content is divided into parts or sections and each part has a requirement in the learning model and cleanses a model that is relevant only to the needs of the student and to which the learning requirement applies, often consisting of the student ' s level of knowledge.

7- **Write-offs of information**: This pattern is based on the introduction or deletion of part of the text content based on the student ' s performance and its adaptation to the content offered.

Current research is limited to the sixth pattern of presentation of successive adaptive content because it is characterized by a sequence and consistency in the presentation of academic self-efficiency content while allowing the learner to control the educational content and learning according to his/her abilities, diversity in the presentation of learning material, taking into account the student ' s level of knowledge.

Serial mode of presentation of adaptive content:

The content is divided into parts, each part of which has a requirement in the student model, and the system shows the part that is only relevant to the student ' s needs and to which the learning requirement applies: the student ' s level of knowledge(starter, average, expert).(Rabi Ramud, Sayed Shaaban, 2016, 13)

Characteristics of the sequential mode of presentation of adaptive content:

Abu Raihan & Han (2009) indicates the characteristics of the successive adaptive content presentation mode**:**

1- Clear, easy to implement **.**

2- Reduce confusion in content presentation and focus on content offered to provide an easy transition between student knowledge levels**.**

3- Reduces the increased cognitive burden on the student of presenting all information in the context of his or her learning of electronic content**.**

4- Direct the user to the appropriate course of learning according to the information contained in the user ' s model, thereby overcoming the problem of fragmentation in the content of the decision**.**

Second-Academic self-efficiency.

The importance of academic self-efficiency is illustrated by the relationship to concepts that affect individual effectiveness and ability to deliver. Educators with high self-efficiency set high-level goals and are more persistent and diligent in their pursuit, while learners with low self-efficiency set low-level goals and are less persistent and enthusiastic in achieving them (Abdallah Abdul Ghafoor, Sima Mustafa, 2008).

Definition of academic self-efficiency:

According to Kim& park, 2000, academic self-sufficiency is a set of judgments by the learner that express his beliefs about his ability to conduct certain behaviors, his flexibility in dealing with complex difficult situations, and the challenge of his perseverance in carrying out his mandated tasks.

According to Lauren (2012), academic self-sufficiency has been perceived by the learner as being able to perform and achieve educational goals.

It is also defined as the judgment of learners over their abilities to learn, master, organize and implement new knowledge and skills to reach high academic performance levels. (Musa,2020,36).

It follows from the definitions of academic self-sufficiency that:

- Knowledge, skills and experience of an individual on a subject.
- Supports his self-confidence to continue to carry out the work entrusted to him successfully.

- The individual shall determine his or her capabilities and preparations in advance to enable him or her to determine his or her ability to carry out the work required of him or her successfully.

Academic self-efficiency consists of three components, one of which varies according to the level of efficiency, the first being the degree of efficiency, and represents the level of individual motivation to perform tasks in different fields and situations. This level varies based on the nature of the situation, its difficulty and generality. It is intended to shift self-efficiency from one position to another similar position, the third being the strength of the individual ' s own competence by reference to his previous experience and experience, and its suitability for the situation he is experiencing through perseverance and effort (Nusra Gilgal, Aladdin al-Najjar, Sara Saqr,2021)

Academic self-efficiency operates on a multi-level and multifaceted set of beliefs that affect the sense of the learners, their thinking, their motivation, and their conduct during different educational missions. The development of academic self-efficiency is closely linked to the experience, competencies and tasks of the learner in different areas at different stages of life, Sharma and Nasa, 2014).

Academic self-efficiency beliefs lead to the privilege of the learner by increasing commitment, pursuit, perseverance and attribution of academicly high-level learners to failure to try less rather than low capacity, while low-academic self-qualified learners attribute their failure to weak capacity; therefore, academic self-efficiency can influence the choice of tasks and perseverance in carrying out them. In other words, learners with low academic self-sufficiency are more likely to be afraid to do their jobs, avoid them, postpone them, and abandon them soon. (Hayat ,et al,2020)**.**

Search steps:

1- Preparation of the conceptual framework through a review of the literature and studies relating to Arabic and English-related changes in current research for use at the research stages.

2- Preparation of the measurement tool (academic self-efficiency measure) and survey of judges' ' opinion on the applicability of the instrument and then calculation of statistical parameters.

3- Design, production and submission of experimental processing material to a number of judges' for clearance and modifications.

4- Conduct of the exploratory experiment to control the study tool, determine the appropriateness of the experimental processing material, determine the time plan for the completion of its study, and identify the difficulties that may arise during the implementation of the basic research experiment

5- Conduct the basic research experiment in accordance with the following steps:

- Selection of a sample of students from the second division of the Department of Education Technology, College of Quality Education, University of Minnea for the year 2022/2023.

- Applying the measurement tool (academic self-efficiency measure) previous ly to the research sample.

- Application of experimental processing material to the research sample.

- Application of the measurement tool (academic self-efficiency measure) Postly to the research sample.

- To obtain and process data statistically to test the validity of the imposition and to reach, discuss and interpret the results.

- To present recommendations and proposed research in the light of the results.

Action to build experimental processing material:

Design and production of experimental processing material :

The experimental processing material was designed and produced in accordance with the general educational design model ADDIE: design of a learning environment based on the sequential mode of presentation of the adaptive content by booking and stabilizing a special Server area, Modle, producing the academic self-efficiency content in the form of multimedia (text, voice, image, video) and producing educational activities relevant to each subject. The figure shows the educational design of the research**.**
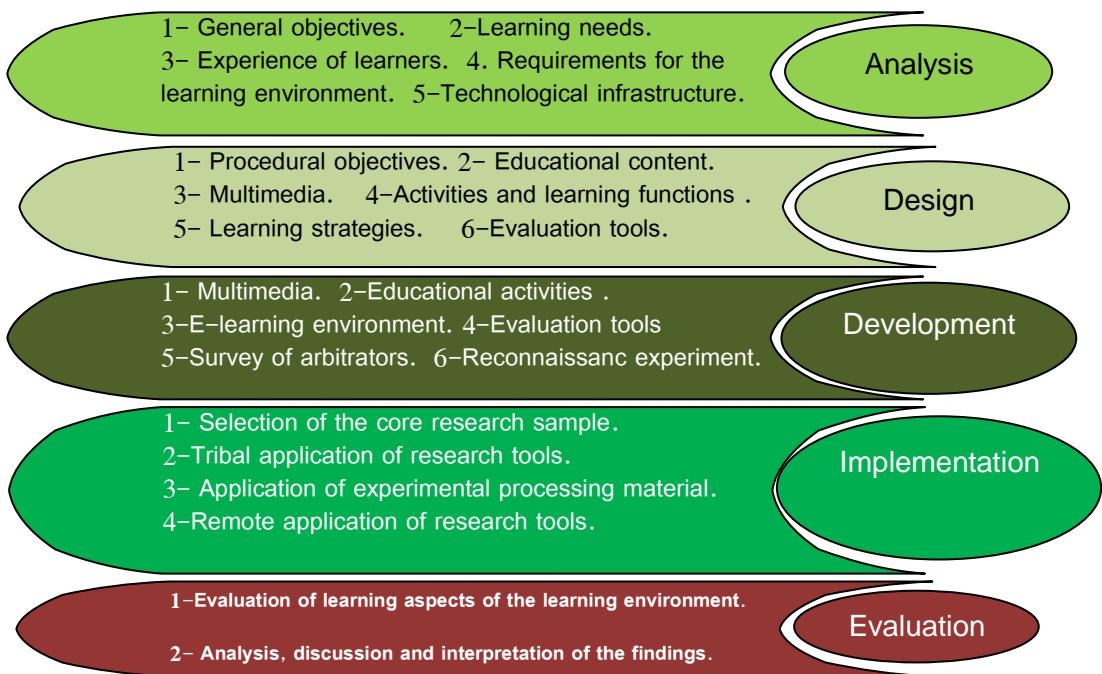
The general model of educational design adapted by the researcher

- Preparation of texts: texts on the content submitted have been prepared through :
  - o Microsoft Word and Adobe Photoshop cs. Text preparation took into account the type and size of the line in the headlines and subheadings as well as the content.
  - o Preparation of photographs and fixed drawings: drawings on the subject of the contents were

produced using the program Adobe Photoshop cs6 and added to the text files.

- o Video development: skills videos were produced using Camtasia Studio video recording and processing using Adobe Premiere Pro CS6, Adobe After Effects CS6

- The establishment of a YouTube channel to upload these videos to YouTube, in preparation for adding them to the successive adaptive content mode environment. A set of bases were taken into account in the production of learning content:

- The length of the video is not more than 15 minutes to maintain student concentration and not to disperse; the shorter the video time the higher the student concentration.

- One video covers only one subject and only one subject, and if the subject is large, it is divided into small parts.

- Educational activities: learning activities were produced using the Adobe Photoshop program for presentation to the environment of presentation of the successive adaptive content pattern, time for implementation and addition of the link of delivery through the environment.

- Building an e-learning environment to provide a sequenced adaptive content pattern :

  - o The content was raised through the learning environment based on the sequenced mode of presentation of adaptive content: In this step, the researcher: uploaded video files on YouTube, which was created through the link: https://www.youtube.com/playlist?list=PLohTOUqZ q5kZ4F3k19PNV_2yat2JumM8B

By presenting that environment to a group of judges' for clearance, proposed amendments and final form.Most judges' agreed by 86% on the validity of the e-learning environment based on the sequential mode of submission of adaptive content, with the searcher directing some modifications, most of which were limited to the harmonization of certain lines and

colors, and the researcher made the required modifications and the environment was ready for application.

b. Academic self-efficiency measure .

− **Specify the purpose of the measure :**

Assessing the degree of academic self-efficacy among students in educational technology. Formulation of the terms of the scale.

In formulating the phrases, the following were taken into account:

- o Language integrity and clarity of meaning.
- o The phrase contains one idea.

− Presentation of the preliminary image of the scale to a group of judges' :

The preliminary picture of the scale was presented to a group of judges' for an opinion on the following:

- − The importance of each statement in the scale.
- − The linguistic accuracy of the formulation.
- − The removal of any inappropriate statements.
- − The addition of any necessary statements.

Final portrait of the academic self-efficiency measure.

The judges' pointed to the deletion of some words that were not appropriate to the scale, and the addition of other phrases to the measure in its final form, where the measure would be from (30) words that would always be answered through a triple estimate (sometimes - never - never) where the positive words (3.1.1) would be given, while the negative words would be given the values (1.2.3) and thus the order would range from (30-90).

• **Calculating the psychometric properties of the academic self-efficacy scale (validity, reliability):**

First, validity:

- Validity of the judges' ratings. The two judges' certified: the researcher presented the measure to 7 of the judges' in the fields of education technology and psychology, and asked them to give a favorable opinion on the language wording of the terms of the measure, the scientific accuracy and the appropriateness of the paragraphs for measuring the academic self-efficiency of students in education technology.

Validity of internal consistency: Internal consistency has been calculated to verify internal consistency. The correlation between the degree of each paragraph of the scale and the overall degree of the scale has been calculated. The values of the correlations ranged from 0.64:0.82, all of which are statistical function factors at the level of significance (0.01), which indicates that the measure is genuinely consistent internally.

Reconnaissance experiment.

The researcher conducted the reconnaissance experiment on a group of 10 students from the research community and non-indigenous sample, selected randomly. The exploratory experiment was applied in the second semester of the school year, from 12 February 2023 to 28 February 2023, and the researcher followed up, observed and interacted with students within the electronic environment, as well as answered and discussed their questions and questions. The content of the e-learning environment was presented to the students. After the completion, telemetry tools were applied to students and the results were monitored.

Scale stability: In order to verify the stability of the scale, the researcher applied the measure to a sample survey of 10 learners from the study community and outside the research sample, using the Alfa Kronbach coefficient for the parameters of the measure. The constant coefficients ranged from 0.81:0.92 to the total score (0.87), which is statistically significant at the sign level (0.01), indicating the stability of the academic self-efficiency measure.

Research results:

Verification of the imposition:
There is a statistical difference of at the level of 0.05 between the average student grades in the previous and Post measurements of academic self-efficiency in favour of telemetry.

Table of significance of the difference between the average scores of students in the pre- and post-measurements of the academic self-efficacy scale in favor of the post-measurement (degree of freedom = 59)

Tools	Number of students	Application	Mean	Standard deviation	T-value	Significance level	Eta square	Effect size
Academic self-efficacy scale	30	pre	9.63	2.68	34.25-	0.00	0.910	large
		Post	25.10	1.79				

The above table shows:

Statistically, there is a difference of D at the level of 0.01 between the two average student grades in the two previous measurements of academic self-efficiency in favor of telemetry, with the value of "T" (34.25) in the academic self-efficiency measure; the imposition is therefore accepted.

Given that the concept of statistical significance reflects the degree of confidence that we attach to the results of differences regardless of the magnitude of the impact of those differences; therefore, the size of the impact was calculated as "ETA square," and by comparing the results with the reference table for determining impact levels, the magnitude of the impact was found to be significant, with the value of the ETA square (0.910) in the academic self-efficiency measure, indicating that the size of the impact of the independent variable on the dependent variable was strong; this confirms the effectiveness of the experimental treatments conducted on the research pilot group.

Interpretation of results:

1- Easy to use a learning environment based on a sequential adaptive learning pattern, where its use does not require complex technical skills, it is sufficient for students to know how to register, sail within the system and perform activities and raise them to the environment, which has led to continued motivation for learning, as well as to remove fear of using them

2- The clarity of the content & apes; s educational objectives through the learning environment based on the adaptive and sequential learning pattern has helped students to define the subject and to understand the content in greater depth.

3- The diversity of learning and presentation components and their use; such as text, fixed images, drawings, videos and other elements that draw the attention of learners to the content of learning.The importance of studying the subject of academic self-sufficiency among students of the research group.

4- Increased interest, attention and focus to accommodate the educational content, as illustrated in the measure of academic self-efficiency

5- Integration between the high level of achievement and the high level of skilled performance of students.

Research recommendations :

1- To promote awareness of the importance of adaptive content delivery patterns, especially in academia, and their role in the educational process through meetings, symposiums and conferences.

2- Organization of training courses for teaching staff in educational institutions to train them in the use of adaptive content delivery patterns in the construction of successful courses.

3- Include in the curricula of educational colleges detailed subjects on modes of providing adaptive content and training students in its use, for use in different educational attitudes.

4- To move towards the subject of academic self-competence and include it in the curricula and curricula of academic students .

Proposed research

1- Conducting studies similar to the present study with changing educational content, the content of learning may have an impact on research results.

2- Conduct a comparative study of modes of introduction to other educational skills.

3- Conducting studies similar to the current one for graduate students.

4- Study the impact of the independent variable on the mode of submission of adaptive content on dependent variables other than academic self-efficiency.

5- Examine the effectiveness of modes of delivery of adaptive content on university college-level achievement.

6- Study the impact of different tools and activities used in environments based on modes of delivering adaptive content on learning outcomes.

7- Undertake studies in the design and dissemination criteria of courses in environments based on modes of delivery of adaptive content.

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