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Designing an Assistant Application for Teachers with Varying Cognitive Flexibility to Use the Pedagogical Applications Wheel as a Reference Tool to Improve the Integration of Technology into Classrooms Preparation

Dr. Noha Abdel Hakam Ahmed Abdel Baky[1]

Research Summary

The current research aims to design an auxiliary application as a reference tool for teachers for the purpose of identifying technological applications that are appropriate for the activities and behavioral actions associated with each level of Bloom's educational objectives using the Pedagogical Applications Wheel (PW).(created by Allen Carrington) Carrington, (in order to improve the integration of technology into the classroom, and to achieve that goal, the cognitive flexibility scale of Al-Adwan and Al-Bourini (2021) was applied to the research sample to classify them into three groups: (high - average - low) cognitive flexibility, and both the descriptive and methodological approaches were used. Quasi-experimental experimental design, and the auxiliary application (reference tool) was designed using the Thunkable platform(According to the criteria for designing an auxiliary application for teachers with varying cognitive flexibility to use the Pedagogical Applications Wheelas a reference tool to improve the integration of technology in the classroom and then download it on the teachers' phone devices, where the research experiment was applied to (34) female teachers in schools in the Asir region, and included the educational content (Integrating technology into the classroom - Pedagogical Applications Wheel - using the auxiliary application) and then applying the research tools (pre-post) in (the cognitive test - observation card - teacher satisfaction measure), and the results showed that there were statistically significant differences between the average scores of the experimental groups (low, medium, high(Cognitive flexibility in the post-application of the cognitive test, observation card, and teacher satisfaction scale towards improving the integration of technology in the classroom. It was also shown that there were statistically significant differences in favor of the group (high cognitive flexibility) and then the group (average cognitive flexibility). It was also shown that there was a strong statistical correlation. Strong positive results between the results of the cognitive test, the observation card, and the teacher satisfaction scale. In light of these results, a set of recommendations, studies, and proposed future research were presented regarding the necessity of designing reference tools for teachers based on providing models for integrating technology into teaching.

Key words: *An assistant application - a reference tool for the teacher - Pedagogical Applications Wheel - Cognitive flexibility - Integrating technology into the classroom*

Introduction

Technology and its multiple applications are an essential factor in the development of any diverse field of life, which requires building and presenting proposed frameworks and models for how to integrate or employ these applications in every field. One of these fields is the field

[1] Assistant Professor of Educational Technology, College of Education - King Khalid University, Email: noha@kku.edu.sa

of education, with its theoretical pedagogical foundations and principles and teaching and practical practices within the classroom. Academic.

It has been confirmed by the International Society for Technology in Education ISTE There is a need to design educational applications and environments for teachers in this era by choosing educational technologies that suit the characteristics of each category, using digital tools and resources to design educational activities, and customizing and adapting learning experiences. The International Society for Educational Technology (ISTE) has identified A set of skills that must be available in the teacher to ensure the effective use of technological applications that can be improved in the classroom, including: the teacher's ability to design and develop teaching practices by employing technology to stimulate student learning and creativity, and adapting this technology to enrich educational concepts, foundations, and professional practices and investing in it to increase motivation. Learners towards learning)Abdul Hamid, 2020) and (ISTE, 2020).

Talan (2020) pointed out(to the effectiveness of phone applications in accessing information without being restricted by the limits of time and place and the ability to control the learning process according to needs and individual differences. Portable or mobile technologies are no longer used for communication and communication only, but rather go beyond that in providing an easy way for learners to access the information they want. And interact with it, and use it for educational purposes, free from the constraints of space and time.

Hassan's research (2019) points out the most prominent advantages of using mobile devices and their applications, which are that they can be used at any time and in every place. They are also lighter in weight, smaller in size, and easier to carry, in addition to being a means of fast communication with the Internet and easy access to... Information and educational experiences, and provides interactivity in the learning process, freedom of control over learning content, and active participation with ease of exchanging messages in all forms of multimedia.

The technological field is full of many platforms that provide hundreds of applications that can be used or employed in the educational process, which confirms that teachers, despite their varying cognitive flexibility, will not be able to comprehend all of these applications except through pre-prepared models.

Many models have been built that define the criteria for integrating technological applications into the classroom according to the levels of behavioral educational objectives, as it saves the teacher the trouble of randomly searching the vast amount of technological applications and focusing on the standard technological applications that are compatible with each educational objective. Some of these models are also considered... A planning framework for teaching practices using technology.

There are many models for integrating technology into classrooms, including the SAMR model,(and the TPACK model,(and the Pedagogy Wheel modelAll of them provide the teacher with a plan that combines concepts, educational foundations, and technological applications and integrate them into the classroom, which ensures their effective integration into teaching practices within the classroom, as well as achieving the teacher's level of satisfaction with this integration in light of their varying cognitive flexibility.

Mustafa's research (2022) indicates that the teacher's cognitive flexibility variable is one of the most important adaptation factors that enable him to act in new teaching situations in a way that helps him understand this reality and adapt. With him according to the requirements, it also helps the teacher to correctly evaluate and issue judgments objectively, and to have a

positive vision for every teaching situation, and to understand the other party and a feeling of enjoyment and happiness as a result of cognitive comfort and cognitive balance. It also reduces the tension and distress resulting from problems, which helps in reaching solutions to these problems. Then achieve the required goals and improve his level of satisfaction with his performance in using technology in the teaching process.

The reference tool for integrating technology into classrooms may work to increase teachers' satisfaction with integrating technology into classrooms, which was confirmed by Al-Ahmad's (2023) research of teachers' satisfaction and its relationship to achievement motivation in Homs schools, while the research of Al-Khasoosi and Abdel Moneim (2023) dealt with modeling causal relationships for personal traits and expectations. Professionalism and satisfaction with academic life among student teachers at Al-Azhar University, and the Al-Sharafat research (2023) dealt with the level of satisfaction and attitudes of teachers in Jordan towards the use of technology and digitization in teaching, and the research by Al-Ruwaili and Al-Rifai (2017) which dealt with the levels of satisfaction among teachers with functional variables, which contributes significantly It is essential to improve this integration and achieve the desired educational goals in each classroom using technological applications.

Research Problem

The scarcity of web or phone applications in the Arabic language (to the extent of the researcher's knowledge) that address models for integrating technology into teaching, or applications that help the teacher in developing his knowledge and pedagogical skills and integrating technology into the classroom, or that provide a framework for the teacher to determine appropriate educational activities within the classroom This is what prompted the researcher to design an assistant application for teachers to improve the integration of technology in the classroom as a reference tool for the teacher in determining the correct behavioral actions, associated educational activities, and appropriate technological applications for each of the educational goals within the classroom, using Pedagogical Applications Wheel

Based on the above about training teachers on models for integrating technology into teaching, depending on their level of cognitive flexibility, the research problem was determined in the necessity of training teachers on models for integrating technology into teaching, such as the SAMR model,(. and the Pedagogy Wheel model(and how to use and employ them in the educational process during preparation in colleges of education or during service as professional development for the teacher, with the possibility of employing the technological tools that every teacher possesses (mobile phone devices and their multiple applications) to develop them professionally by providing an auxiliary application as a reference tool that includes presenting the educational foundations of Pedagogical Applications Wheel, standards for models and frameworks for integrating technology, and steps for using it in the classroom.

In light of this, the main research question crystallizes in" How can an assistant application be designed for teachers to improve the integration of technology in the classroom as a reference tool for the teacher for one of the models of integrating technology into teaching (Pedagogical Applications Wheel PW)Do teachers have varying cognitive flexibility (high - medium – low)?

The following sub-questions branch out from the previous main question:

1- What concepts and skills for using the "Pedagogical Applications Wheel" model are necessary for the professional development of cognitively diverse teachers to improve the integration of technology in the classroom?

2- What are the criteria for designing a helpful application for cognitively diverse teachers to use the Pedagogical Applications Wheelas a reference tool to improve technology integration in the classroom?
3- What is the effectiveness of the design of the reference tool in developing the cognitive aspects of teachers (high flexibility - medium flexibility - low flexibility) towards improving the integration of technology in the classroom using Pedagogical Applications Wheel?
4- What is the effectiveness of the design of the reference tool in developing the skill aspects of teachers (highly flexible - moderately flexible - low flexible) towards improving the integration of technology in the classroom using Pedagogical Applications Wheel?
5- What is the effectiveness of the design of the reference tool in developing the level of satisfaction among teachers (high flexibility - medium flexibility - low flexibility) towards improving the integration of technology in the classroom using Pedagogical Applications Wheel?
6- What is the correlation between the availability of concepts and skills and the level of teachers' satisfaction towards using the Pedagogical Applications Wheel (PW) (And the level of cognitive flexibility among teachers towards improving the integration of technology in the classroom?

Research Hypotheses

1- There are statistically significant differences at the significance level (0.05(between the average scores of individuals in the experimental research groups (high - medium - low) cognitive flexibility in the cognitive aspects related to the Pedagogical Applications Wheel.
2- There are statistically significant differences at the level of significance (0.05(between the average scores of individuals in the experimental research groups (high - medium - low) in cognitive flexibility in the skill aspects related to the Pedagogical application wheel.
3- There are statistically significant differences at the level of significance (0.05(between the average scores of the members of the experimental research groups (high - medium - low). Cognitive flexibility in developing the level of satisfaction among the research group towards integrating technology in the classroom using the Pedagogical Applications Wheel.
4- There is a positive correlation between the average scores of the cognitive and skill aspects and the level of satisfaction towards integrating technology in the classroom using the Pedagogical Applications Wheel.

Research Objectives

The current research aims to:

1- Determine the availability of concepts and skills for using the Pedagogical Applications (Wheel PW).(I have teachers).
2- Designing an assistant application as a reference tool for teachers to integrate technology into the classroom in light of the Pedagogical Applications Wheel (PW)
3- Measuring the effectiveness of the reference tool in improving technology integration in the classroom.
4- Determining the correlation between the concepts, skills and level of teachers' satisfaction towards using the Pedagogical Applications (Wheel PW) .(Towards integrating technology into the classroom.

The Importance of Research

The importance of research for both educational officials and teachers becomes clear as follows:

1. Educational Officials

i. Drawing their attention to the importance of adopting the use and employment of the PW Pedagogical Applications Wheel(in the classroom as a reference tool for the teacher in determining the correct behavioral actions, associated educational activities, and appropriate technological applications for each educational goal.
ii. Achieving integration and integration between educational concepts and knowledge and technological applications with the aim of keeping pace with technological progress and benefiting from the technological applications it provides that help the teacher improve the integration of technology in the classroom.

2. The Teachers

i. Providing them with a reference tool to improve the integration of technology in the classroom as a reference tool for teachers with varying cognitive flexibility (high - medium - low) in identifying the correct behavioral actions, associated pedagogical activities, and appropriate technological applications for each educational goal within the classroom using (the PW Wheel of Pedagogical Applications).(In light of cognitive flexibility.
ii. Developing the level of techers' satisfaction towards integrating technology into the classroom using the PW Pedagogical Applications Wheel).

Search Terms

- Assistant Application (Teacher Reference Tool)

A mobile phone application that includes an integrated, organized and interconnected plan for educational content that addresses the concepts and skills of using the Pedagogical Applications Wheel, as a reference tool for the teacher in determining appropriate technological applications in light of the correct behavioral actions and educational activities related to each of the educational objectives within the classroom.

- Application Wheel (Pedagogy Wheel)

Known as its creator, Allen Carrington Carrington, 2015(is a tool designed to help teachers think systematically, compatible and interconnected with teaching objectives, about how to use mobile phone applications in their teaching. It is also a way of thinking about teaching by integrating technology into teaching and curriculum planning and development, in light of learning objectives while designing student-centered activities using technological applications.

The researcher defines it procedurally as a framework that clarifies knowledge and technological applications that are appropriate for each of the behavioral actions for each level of Bloom's cognitive goals, and the educational activities associated with them that help the teacher in integrating technology into the classroom.

- Cognitive Flexibility

Mustafa's research (2022, 202) defined cognitive flexibility as: the individual's ability to review his way of thinking and restructure knowledge to adapt to the influences of the changing

environment. The ability to know the available options and alternatives for a situation and adapt his response according to the requirements of the situation that directs him, in addition to his desire to be flexible. Producing multiple alternative solutions to difficult and changing situations.

The researcher defines it procedurally: as the score that the teacher obtains after applying the cognitive flexibility scale, Al-Adwan and Al-Bourini (2021), which expresses the level of the teacher's ability to review her way of thinking in choosing alternatives available with technology in improving the integration of technology into teaching.

- Effectiveness of the Auxiliary Application

Positive results with statistical significance for the research sample groups' scores in the cognitive test and note card and their level of satisfaction towards improving the integration of technology in the classroom using the Pedagogical Applications Wheelmodel after studying the auxiliary application (the teacher's reference tool(.

- Improve the Integration of Technology into the Classroom

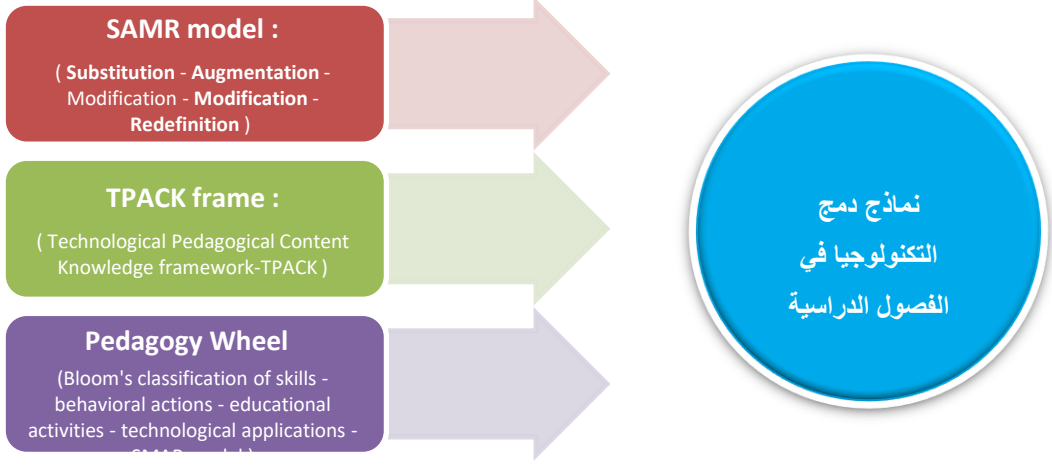
Employing appropriate technological applications that relate to each behavioral act and educational activity for each level of Bloom's cognitive goals in light of one of the standard models such as Pedagogical Applications Wheel.

Theoretical Framework and Previous Studies

(1) Models for Integrating Technology into Classroom:

The educational field is full of many proposed models and frameworks for integrating technology into classrooms, which are being developed and newer versions of which are presented in light of the rapid technological developments from time to time. Figure (1) shows some of these models.

Figure (1) Models for Integrating Technology into Classrooms.



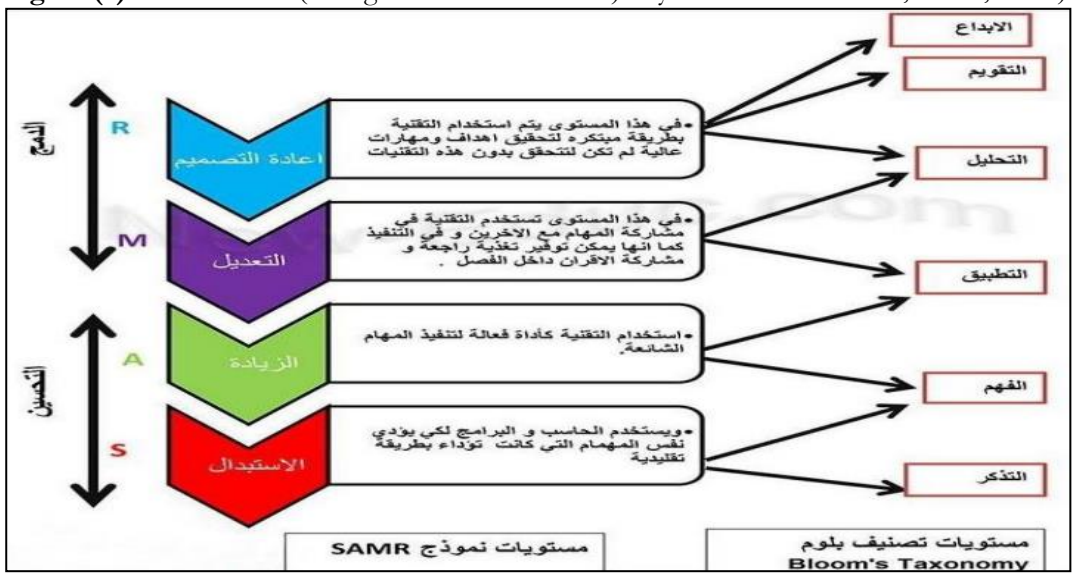
(A) SAMR Model

The SAMR model is(... An innovative idea and model for integrating technology into classrooms designed by Puentedura, 2006(is an abbreviation for four levels of technology

integration into teaching) **S** substitution- **Augmentation** _ -Modification _ _- **Redefinition** _) (Abdel-Raouf et al., 2022, 218), and it was developed with the aim of encouraging teachers to improve the quality of teaching in the classroom by integrating technology (Al-Saidi et al., 2022, 32.(

It is considered a model for integrating technology into classrooms through specific levels in which the level of educational activity increases through four stages (the same task with new technology - improving the work by adding a new feature - modification and change in the work - a completely new task), and Figure (2) shows the employment of the model (SAMR(In light of Bloom's levels of cognitive goals.

Figure (2): SAMR Model(In Light of Bloom's Levels)Maysa Ramadan Al-Saidi, Et Al., 2022.)



As for teaching using the SAMR modelThis is done by answering the questions shown in Figure (3)

Figure (3): Teaching Using the SAMR Model (Maysa Ramadan Al-Saidi and Others, 2022).

This model has faced many criticisms because it lacks many details, but it can be relied upon as one of the educational models for integrating technology into classrooms (Abdel-Raouf et al., 2022).

Among the studies that dealt with the employment, integration, use or role of the SAMR model (Al-Saidi et al., 2022) which examined the effectiveness of a training program based on the SAMR model(in developing the skills of electronic teaching practices among (30) male and female biology teachers at the Al-Azhar secondary stage, and the results showed that there were statistically significant differences at the level of significance (0.05) between the average scores in the pre- and post-measurements for both (the cognitive achievement test related to electronic teaching practices - Note card for the performance of the cognitive aspect of electronic teaching practices.

The research by Al-Far and Shaheen (2017) examined the effectiveness of using the Samer modelSAMR to integrate technology into the classroom in the mathematics course and the attitude towards it among (40) students in the middle school. The research reached results, including the presence of a significant difference between the average scores of the two groups (control and experimental) in the mathematics post-achievement test, as well as the results of the attitude scale in favor of the post-application. The research then recommended holding workshops to raise awareness among faculty members in schools and universities and encourage them to integrate modern technology and benefit from it in light of the SAMR model. The research suggested conducting more research on the effectiveness of the SAMR modelIn other academic subjects.

Ali's (2020) research addressed blended reality and technology in teaching and the role of Samer's model"SAMR" in this, where technology is integrated through pre-defined stages according to the model, in which the level of activity gradually rises and educational benefit increases. This research presented a proposed model that combines both the SAMAR model andOn the one hand, this model represents a useful tool to help teachers think about using their technology, as it begins with making simple changes in the ways of designing and implementing technology and leads the learner's educational experience to achieve the next level, and virtual education on the other hand to increase opportunities for individual education.

The research by Al-Ashqar (2021) dealt with the use of a modelSAMR for teaching an integrated science course through Google Educational Classrooms to develop deep understanding and technological acceptance among (90) student teachers at a women's college, and the results of the T-test showed(and the size of the effect, that teaching using the SAMAR model Through Google educational classes, it helped develop deep understanding and technological acceptance among female student teachers.

The research of Khaled and Radi (2021) dealt with the impact of the SAMAR model Using special exercises to learn the skills of scoring from the free throw line and the ladder in basketball for (60) student teachers in the College of Education, Department of Physical Education and Sports Sciences at Al-Mustansiriya University. The results showed the superiority of the experimental group that used the model to accompany the skill exercises in learning some skills in basketball. The results showed that the proposed educational units that included the use of the model had a positive impact on learning offensive skills in basketball.

Ali's (2022) research aimed to identify the effect of using the SAMR model To integrate virtual classrooms into teaching on developing digital skills and self-efficacy among (60) male and female natural history students at the Faculty of Education at Beni Suef University with the (analytical/holistic) cognitive style. The results showed that there was a statistical significance for the difference between the average scores of the students in the pre- and post-applications for each. From the achievement test, the observation card, and the self-efficacy scale in favor

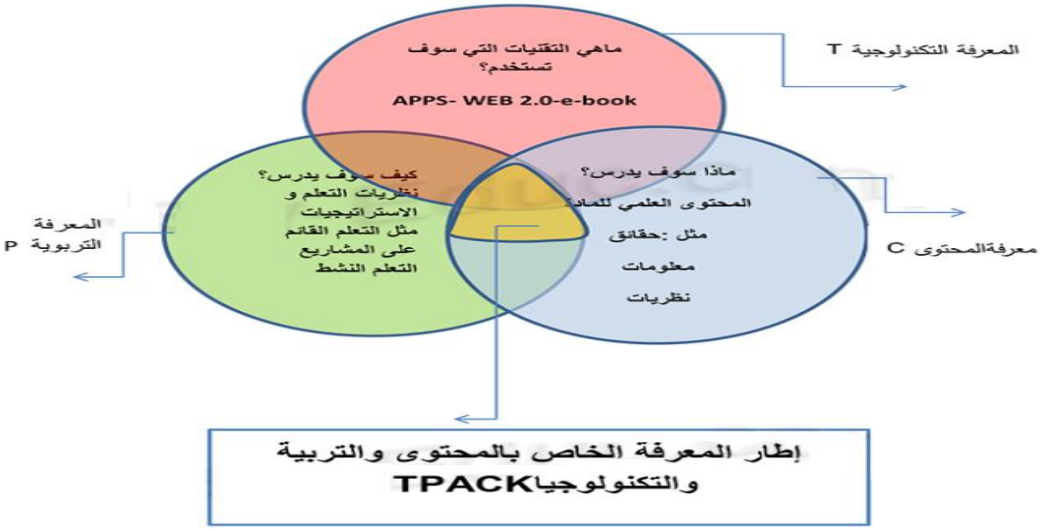
of the post-application, as well as the presence of a statistical function for the difference between the average scores of the students (analytical/holistic) in the post-application of both the observation card and the self-efficacy scale in favor of the students with the holistic approach. The results also showed the existence of a positive correlation between Digital skills and self-efficacy among students.

As for the research (Eman Aly, 2022It aimed to identify the impact of teaching enhanced with the SAMR model(to develop reflective teaching skills among (60) student teachers at the Faculty of Education at Sadat City University. The results of the analysis of responses to the post-application of the reflective teaching scale and the analysis of the observation card results showed that there was an improvement in the performance of the experimental group that studied using dialogic teaching enhanced with the SAMR model.(is higher than the performance of the control group participants who received usual teaching.

(B) TPACK Model

Model) TPACK(aims to clarify the teaching competencies necessary for the teacher of the twenty-first century, as the model explained that the teacher must possess the three components of the model in an integrated manner, as the teacher's knowledge of the content of the specialty subject and the methods necessary to teach it are not enough, but rather he must have sufficient technological knowledge to teach the content, Therefore, it is a model that explains the basic rule for good teaching using technology because it describes the knowledge that the teacher should rely on in designing curricula and educational strategies using technology. The figure shows the intersection of the three knowledges (content, education, and technology) within a framework that integrates them together and identifies questions about each of them separately, and this is what It is shown in Figure (4) (Abdul Hamid, 2020).

Figure (4): TPACK Model Framework.



Among the studies that dealt with the employment, integration, use or role of the (TPACK) model Both of Sabri's (2019), which dealt with measuring the impact of a program based on the TPACK model Using infographic technology to develop the skills of producing infographics and cognitive achievement among (21) middle school teachers in Saudi Arabia, then teaching the proposed program to them, then applying the infographic making skill

measure and the post-achievement test on the same group. At the beginning of the second term of the academic year, the visual generative thinking test and the mathematical communication test were applied pre-tested to the second group and the third group of first-year middle school female students. Then the mathematics unit was presented in the traditional way to a number of (30) female students of the second group, and the same unit was presented using the technology Infographics for (62) female students of the third group. Then the visual generative thinking test and the mathematical communication test were applied to the female students of the second group and the third group post-test. By collecting the data and applying appropriate statistical treatments, the researcher reached the results: There was a statistically significant difference in favor of the average scores of the post-application for the research group. In the primary (teachers) measure of the skill of making infographics and the cognitive achievement test, there was a statistically significant difference in the average scores of the post-application for the third research group in the visual generative thinking test and the mathematical communication test.

The Research by Al-Enezi and Al-Shaddadi (2018) aimed to determine the extent to which (169) Arabic language teachers in the secondary stage in Riyadh applied each of the three areas of knowledge, educational technology and content knowledge, while revealing the relationship between their knowledge in the areas of knowledge.TPACK And demographic variables, as well as knowing the extent to which they apply these areas from the point of view of their educational supervisors. This Research also aimed to design a model based on a frameworkTPACK and the Gerlac-Wiley instructional design model for integrating technology into general education. The results revealed that there were statistically significant differences between the average responses of teachers and those of supervisors regarding the degree of knowledge in the fields ofTPACK in actual educational practices, as well as the presence of statistically significant differences regarding knowledge of technology and its branches at a level of significance attributed to the age variable. The Research concluded with the design of a proposed model based on a frameworkTPACK and the Gerlac-Wiley instructional design model for integrating technology into public education. The Research recommended the importance of applying the proposed model to teacher qualification and training programs, as well as conducting studies to find out the reasons for differences in the answers of Arabic language teachers and their supervisors regarding the degree of availability of knowledge in the fields ofTPACK in actual educational practices.

As for the Research (Moreno, 2019)(Addressing the development of teacher training using the TPACK modelBy analyzing research and studies in international databases that address the modelTPACK. Accordingly, the results revealed that there were 37 studies, published between 2014 and 2017, indexed in databases, dealing with the use ofTPACKThe analysis was based on four different criteria: sample, subject, main results, and methodological design. The results showed that all studies reviewed mainly focused on basic and higher education studies, quantitative experimental studies, Mixed studies are prevalent, and there is a lack of longitudinal studies that explain teachers' behaviors when applyingTPACK in their teaching practices using technology.

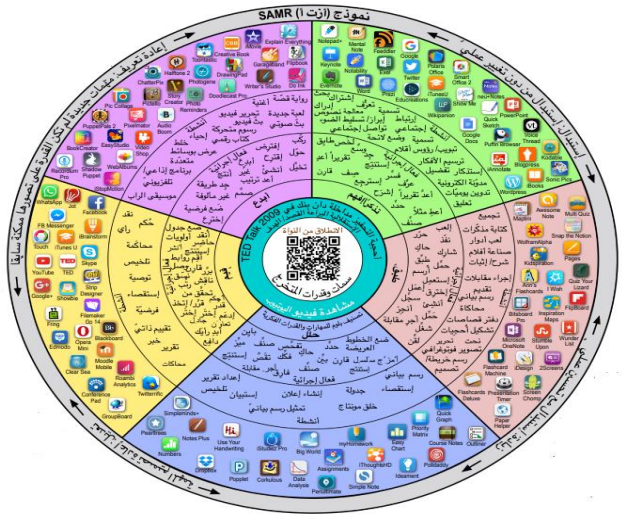
Abdul Hamid's (2020) Research aimed to prepare a proposed program based on the TPACK model Using the Google Education platform to develop teaching competencies based on the dimensions of the TPACK model And arriving at a vision about integrating technology into teaching for (22) female student teachers at the College of Education at Majmaah University, the results of both the achievement test used to measure the cognitive aspects related to the

TPACK competencies and the observation card used to measure the teaching performance of the TPACK competencies were shown. As a scale to measure the perceptions of female student teachers about integrating technology into teaching mathematics, the percentage of availability of TPACK competencies (66.1%) is below the level of 80% among female student teachers. The results revealed that there are statistically significant differences in favor of the post-application, and that the proposed program is characterized by great effectiveness in developing TPACK competencies. The research group's perception of integrating technology into teaching mathematics among female students, and the Research recommended the importance of training on TPACK competencies. To prepare female students for effective teaching in the twenty-first century, as well as the importance of employing educational platforms in teaching female students at the university level.

(C) Pedagogy Wheel

The Pedagogical Applications Wheel is a model that illustrates the knowledge and technological applications that are appropriate for each behavioral act and the associated activities that help the teacher in integrating technology into the classroom.(Carrington, 2015)(Designed according to Bloom's levels of cognitive objectives, the behavioral actions that express each level, the activities related to each level of the objectives, and then the technological applications related to each level and activity. It has been translated into Arabic by Lebanese educators, and it is worth noting that several versions have been issued, and the figure (5) explains the Arabic translation of the fourth edition, while the fifth and sixth editions are available on the website of the Pedagogical Applications Wheel)[11][2].(Two models of applications are released (Android, Apple iOS).

Figure (5): Pedagogical Applications Wheel.



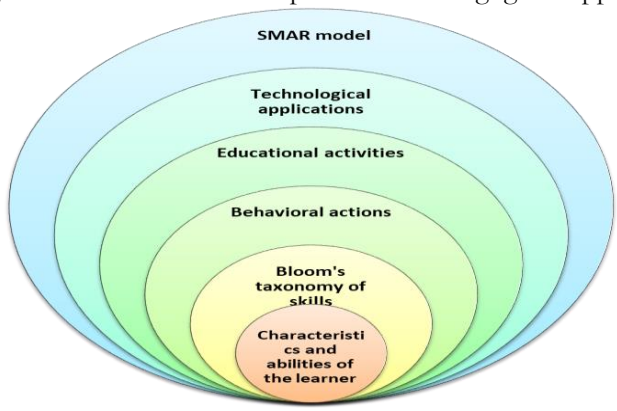
(C-1) The Basic Components of Pedagogical Applications Wheel

Represents Pedagogical Applications Wheel A frame consisting of five overlapping concentric circles that are divided into five sectors, the center of all of which is a smaller circle called the nucleus, as it is the basic starting point for integrating technology into the classroom, as it

(2) https://designingoutcomes.com/assets/PadWheelV5/PW_ENG_V5.0_Android_SCREEN.pdf

represents (the characteristics and abilities of the learner). As for the circles of the wheel, they can be expressed in order from the inside, as shown in the figure (6)

Figure (6): A Diagram to Illustrate the Components of Pedagogical Applications Wheel.



i. Circle (1): represents Bloom's classification of intellectual skills and abilities and levels of cognitive behavioral goals.
ii. Circle (2): represents some behavioral actions that represent each level of cognitive goals
iii. Circle (3): represents the educational activities that the learner must perform related to behavioral actions and their level of goals.
iv. Circle (4): Technological applications, programs and technological platforms that are appropriate for implementing the corresponding educational activities in each sector
v. Circle (5:(Employing the four tasks of the SMAR model

1) Replacement: A replacement without a practical change
2) Increase: Replacement with practical improvement
3) Edit: Redesigned the task
4) Redefining: New missions that were previously unimaginable.

(C-2) The Importance of Developing the Concepts and Skills of the Pedagogical Applications Wheel (PW)

The importance of the Pedagogical Applications Wheel) PW(in that it is a framework that clarifies the levels of cognitive goals, appropriate behavioral actions, activities associated with them, and the technological applications that achieve them to improve the integration of technology in the classroom. Therefore, attention must be paid to developing the concepts and skills of the Pedagogical Applications Wheel) PW) .(for teachers due to the following factors in light of what I emphasized Research) Moreno, ; Colon 2019,(Abdul Hamid, 2020)

1. The teacher of the twenty-first century requires him to employ technology in the classroom not only as a complementary tool, but also requires him to employ teaching methods and strategies based on scientific and pedagogical foundations that employ technology as the basis for all teaching and learning activities.
2. It enables the teacher to choose the activities, activities, and technological tools appropriate to the cognitive content he is studying.
3. Possessing the concepts and skills of the teacher, the Pedagogical Application Wheel (PW) .(has a positive impact on his teaching practices and satisfaction level towards improving the integration of technology in the classroom.

4. The teacher's effective use of technology does not require merely familiarity with technological tools and applications, but rather requires him to rely on employing and integrating technology in accordance with educational principles that encourage students to use technological tools, communicate, exchange knowledge, and other twenty-first century skills.
5. Motivating the teacher to search for digital and technological learning resources necessary to implement curricular activities, and employ them to improve the integration of technology in the classroom and achieve effective pedagogical practices to achieve educational goals.

It is clear from the above that concepts and skills related to the Pedagogical Applications Wheel (PW) must be developed(among teachers due to its direct impact on improving teaching skills using technology. Attention should also be paid to including it in teacher preparation programs in order to prepare teachers who have the ability to employ technology in classrooms effectively in a way that is compatible with the developments of the twenty-first century.

Given this importance, many studies have sought to use and employ Pedagogical Applications Wheel in classrooms, including: a Research) Carrington, 2015).,(and a Research (Carrington, 2016),((Daniela, 2021).

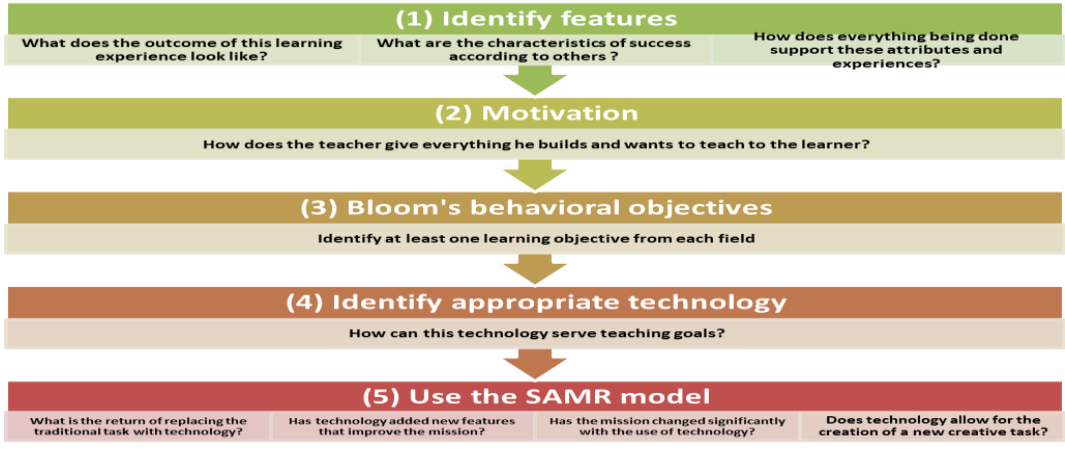
It is worth noting that the Research of Al-Halwani and Salehi (2016) proposed a new model in teaching science and mathematics using robotic technology, and in the Research of Abu Zaid (2022) it addressed the principles of universal design for learning.(UDL) and technology.

The current research sought to develop an auxiliary application based on the Pedagogical Applications Wheel (PW) .(in developing the concepts and skills of integrating technology into the classroom and achieving their level of satisfaction with this integration.

(C-3) Steps for Employing the Pedagogical Applications Wheel (PW)

A series of interconnected guidelines for reviewing the teaching process from planning to implementation, as summarized in the steps (identifying features - motivation - determining educational objectives - determining appropriate technology - using the SAMR modelThis is what Figure (7) shows.

Figure (7): Steps for Employing the Pedagogical Applications Wheel (PW).



1. Defining features: This step lies at the core of learning design. Concepts such as ethics, responsibility, and citizenship must be constantly reconsidered, and in this step the teacher always asks himself a question that can be expressed by one of the following questions:

i. What does the outcome of this learning experience look like?
ii. What are the characteristics of success according to others?
iii. How does everything that is done contribute to supporting these attributes and experiences?

2. Motivation: In this step, the teacher asks himself: How does the teacher give everything he builds and wants to teach to the learner? "Independence, ingenuity, etc?" Based on Bloom's levels of cognitive objectives, it will help the teacher plan educational objectives to achieve thinking patterns.
3. Bloom's Objectives: In this step, the teacher needs to define educational objectives to achieve critical thinking, as he tries to identify at least one educational objective from each field in order to move on to appropriate technological enhancements.
4. Determine the appropriate technology: Here the teacher asks himself, "How can this technology serve the teaching goals?" Technological applications are suggestions. Therefore, the teacher must continue to search for the best technological application that achieves educational goals.
5. Use the SAMR model:(In this step the employment of SAMR is determined And the technological applications that were identified in the previous steps.

(C-4) Criteria for Selecting Technological Application Programs

1- **Standards of Remembering:** Applied programs that are appropriate for the "remembering" stage develop the learner's ability to define terms, identify facts, remember and find information. There are many applied programs that focus on remembering and are limited to choosing the correct answer from a list of options, or matching, or ordering. Sequence the content, or enter the answer.
2- **Comprehension Standards:** Applied programs that fit the "understanding" stage provide opportunities for learners to explain ideas or concepts. These programs, which are appropriate for the understanding stage, move away from the idea of choosing the correct answer and provide an alternative platform that opens the way for learners to summarize the content and translate the meanings.
3- **Application Standards:** Application programs that are appropriate for the application stage provide opportunities for learners to demonstrate their ability to implement learned procedures and methods. These programs also highlight the ability to apply concepts in unfamiliar settings.
4- **Analysis Standards:** Applied programs that fit the "Analysis" stage improve the learner's ability to distinguish what is relevant to the topic from what is not, identify relationships, and understand the organization of content.
5- **Evaluation Criteria:** Applied programs that fit into the "evaluation" stage develop the learner's ability to evaluate materials or methods based on criteria that the learner sets or adopts from external references. These programs help the learner evaluate the reliability, accuracy, quality, and effectiveness of the content to reach informed decisions.
6- **Creativity Standards:** Applied programs that fit the "Creativity" stage provide opportunities for learners to produce ideas, design projects and produce.

The Research dealt with both (Carrington, 2015) (Carrington, 2016)) ,(Daniela, 2021) (Carrington, 2016) emphasized the foundations of building and using the Pedagogical Applications Wheel, while defining the criteria for employing these technological applications in the classroom. They emphasized that designing the Pedagogical Applications Wheel helps

teachers think systematically and coherently in order to achieve effective results for the educational objectives, as confirmed by (Carrington, 2016).(I have to integrate the use of mobile applications into teaching. It will achieve long-term learning goals and increase the motivation and motivation of teachers to develop teaching skills and develop cognitive skills.

Cognitive Flexibility

Cognitive flexibility is one of the important variables that has received the attention of cognitive psychology researchers, as it is a component of thinking, adaptation, personality, and human communication. It indicates a person's ability to change strategies for cognitive processes in order to adapt to new and unexpected situations in the surrounding environment. It also enables... The teacher is able to face different situations and the sudden changes that result from them (Al-Harbi, 2023).

The theory of cognitive flexibility is based on several principles that highlight the role of the individual in gaining a deep understanding of the cognitive content, forming a logic around it, and seeking to apply that content in various contexts in order to apply and transfer knowledge.

Cognitive flexibility has been classified into three dimensions: adaptive flexibility, which means the individual's ability to change the mental perspective through which he looks at solving a problem, and spontaneous flexibility, which means speed in producing the largest number of diverse ideas regarding a situation. And whoever extrapolates the results of cognitive flexibility finds that it is reflected On the positivity of adaptation, and adaptation is achieved by learning ways to identify problems, ways to confront them, how to choose the best method to solve them, and acquiring the necessary skills to deal with problems (Mustafa, 2022, 202).

The Research by Dahi and Ahmed (2022) indicated that there is no specific region in the brain responsible for cognitive flexibility, but rather several regions together, and the union of neural activity between them results in the implementation of cognitive flexibility processes, which is paying attention to distinguishing the stimulus that deserves stimulation, taking a reaction towards it, and switching attention. To perceive unexpected stimuli, to switch and direct attention from a stimulating stimulus, and finally to working memory, which formulates two or more rule representations to carry out the task.

The characteristics of a cognitively flexible teacher, as pointed out by (Mustafa, 2022, 203).

i. High ability to Processing cognitive representations.
ii. The ability to transfer the knowledge he acquires from one situation to another.
iii. The ability to adapt cognitive processing strategies to different environmental conditions expected to face.

Among the studies that dealt with the variable of cognitive flexibility among teachers: a research (Dahi, Ahmed; 2022), which dealt with the level of flexibility (high - low) with the type of creative style (innovative, adaptive) as categorical variables to provide student teachers with digital transformation skills in education, as well as reduce the level of anxiety. Their professional future is through a proposed electronic educational platform. Mustafa (2022) addressed cognitive flexibility and its relationship to well-being among teachers of inclusive kindergartens. Abu Rayya and Al-Jizawi (2022) discussed how to develop cognitive flexibility and the motivation to master teaching student teachers through training on integrating integrative techniques. In teaching molecular biology, Al-Adwan and Al-Bourini (2021) studied the relationship of cognitive flexibility to the level of use of educational cognitive scaffolding strategies among secondary school teachers in Amman Governorate in Jordan.

Al-Adwan and Al-Barwaini (2021) built a measure of cognitive flexibility in light of the fact that cognitive flexibility is the ability to change the cognitive strategies that an individual uses to address new and unexpected circumstances and situations. This definition consists of three basic elements. The first element is that cognitive flexibility is an ability and can therefore be acquired from... During training, the second element refers to a change in the cognitive strategies that the individual uses, which is considered a series of processes that search for solving the problem, and includes evaluating the different characteristics of the stimulus, generating alternatives, comparing them, and then choosing the appropriate alternative. The third element expresses the change that occurs to confront the circumstances. and new and unexpected situations in the environment. Therefore, the current research adopts this scale in classifying parameters into three levels (high - medium - low) of cognitive flexibility.

The researcher benefited from the theoretical framework and studies related to models of technology integration in classrooms in the SAMR model,(and the TPACK model,(and the Pedagogical Applications Wheel) pedagogy wheel(including its components, steps, and standards in designing the auxiliary application (the reference tool), as well as arriving at building a list of concepts and skills for using the necessary (Pedagogical Applications Wheel) model, as well as building the cognitive test, observation card, and satisfaction scale. As well as cognitive flexibility in adopting the scale and classifying the parameters according to to their level of cognitive flexibility.

Research Methodology

The current research was based on:

The descriptive approach to measure three aspects among teachers~~, where~~ the first aspect represents the extent of the availability of concepts and knowledge, and the second aspect represents the skills related to using the Pedagogical Applications Wheel (PW) and the third aspect is the level of teachers' satisfaction towards integrating technology into the classroom.

The quasi-experimental approach is one group that is classified into three categories after conducting the cognitive flexibility scale in order to verify the effectiveness of the assistive application in developing the cognitive and skill aspects of using the Pedagogical Applications Wheel (PW), and the level of satisfaction towards integrating technology into the classroom for each group separately, then determining the strength of the correlation between the results of the three groups.

Research Materials

The current research uses the following tools:

1. A list of concepts and skills for using the "Pedagogical Applications Wheel" model necessary for the professional development of teachers with cognitive flexibility to improve the integration of technology in the classroom.
2. Criteria for designing an assistive application for cognitively diverse teachers to use the Pedagogical Applications Wheelas a reference tool to improve technology integration in the classroom

1. Cognitive flexibility scale to classify teachers into three levels in light of the cognitive flexibility variable

Research Tools

The current research uses the following measurement tools:

1- A cognitive test to measure the cognitive aspect of using the Pedagogical Applications Wheel (PW).
2- A note card to measure the skill aspect of using the Pedagogical Applications Wheel (PW)
3- A measure of teachers' satisfaction level towards integrating technology into the classroom.

Research Procedures

First: Preparing a List of Concepts and Skills for Using the Pedagogical Applications Wheel (PW)

Preparing a list of concepts and skills is an answer to the first question, which states (What are the concepts and skills of using the (Pedagogical Applications Wheel) model necessary for the professional development of teachers with varying cognitive flexibility to improve the integration of technology in the classroom?) where the following steps were followed:

1. A list of concepts and skills for using the Pedagogical Application Wheel) PW) has been prepared(by reviewing the frameworks, systems, and models for employing technology integration in classrooms by studying (Abdul Raouf et al., 2022), (Abu Zaid, 2022), (Abdul Hamid, 2020) (Carrington, 2015) ,(Carrington, 2016), (Daniela, 2021).
2. The purpose of the list: to identify the concepts and skills of using the Pedagogical Application Wheel (PW).(in improving the integration of technology into teachers' classrooms.
3. .3 Building the initial image of a list of concepts and skills for using the Pedagogical Applications Wheel (PW), Then, it was presented to arbitrators and experts in the field of educational technology, curricula, and teaching methods.
4. Reviewing the list of concepts and skills and collecting the required amendments, additions or suggestions from the experts and arbitrators. The final list of concepts for using the Pedagogical Applications Wheel (PW) was reached.(in improving the integration of technology into teachers' classrooms, as in Table No (1).

Table (1): A List of Pedagogical Wheel Concepts and Skills (PW).

the topic	M	Content
- Related educational concepts	1	Bloom's levels of goals
	2	Integrating technology into the classroom
	3	Models for integrating technology into the classroom
- Pedagogical Applications Wheel) PW(	4	Concept
	5	Development
	6	the components
- Steps to employ the Pedagogical Applications Wheel) PW) .(during studying semesters	7	Define features
	8	Stimulus
	9	Determine behavioral goals and activities
	10	Determine the appropriate technology
	11	Use the SAMR model(
- Criteria for selecting technological applications	12	Memorability criterion
	13	standard of understanding
	14	Application standard
	15	Analysis standard
	16	Evaluation standard
	17	Creativity standard

5. Reaching the final list of concepts and skills for using the Pedagogical Application Wheel) PW) .(in improving the integration of technology into teachers' classrooms, which includes three axes: the basic components of the Pedagogical Applications Wheel, the steps for employing the Pedagogical Applications Wheel, and the criteria for selecting technological applied programs.

Second: Note Card for Integrating Technology into Classrooms Using the Pedagogical Applications Wheel

1. **Determining the Goal of the Card:** measuring the skill aspect of teachers in integrating technology into the classroom using the Pedagogical Applications Wheel before and after implementing the research experiment.
2. Defining the skills of the observation card in three axes, so that it includes: (the basic components of the Pedagogical Applications Wheel, steps for employing the Pedagogical Applications Wheel) PW) .Criteria for selecting technological application programs.
3. Estimating the scale scores: The teachers' response to the card items was expressed using scores (3 for those who perform the skill alone, 2 for those who perform the skill with the help of the laboratory, and for those who perform the skill under the guidance of the laboratory)
4. **Validity of the Observation Card:** The card was presented in its initial form to the group of arbitrators to ensure the veracity of the observation card and to measure their skills in using Pedagogical Applications Wheel and the accuracy of wording of its statements, and after making amendments, additions and deletions in light of the opinions of the arbitrators, then the internal consistency validity coefficient of the test was calculated by calculating the correlation coefficient Between the score of each item on the card and the total score of the note card, it was found that the correlation coefficient values exceeded (0.86), which indicates the validity of the note card and its suitability for application.
5. **Stability of the Note Card:** The stability of the note card was calculated using the re-application method, and the correlation coefficient between the scores of the two applications was calculated and amounted to (0.93), which is a value that is statistically indicative of the stability of the card and its validity for the application. Thus, the note card in its final form includes (17) skills, and the final is great. It has (51) degrees
6. **The Final Image of the Observation Card:** Amendments were made to the observation card skills in light of the opinions of the arbitrators and the results of the observation card exploratory experiment, and the card became in its final form as shown at the link [3])

(2) A Measure of Teachers' Satisfaction with Integrating Technology into the Classroom

1. .**Determine the Goal of the Scale :** measure the effectiveness of the assistive application in developing the level of satisfaction among teachers **towards** integrating technology in the classroom before and after implementing the research experiment.
2. **Dimensions of the Scale :** The dimensions of the scale were determined to include: (satisfaction with the integration of technology in the professional development of teachers, satisfaction with the integration of technological applications in the classroom, satisfaction with the reference tool for integrating technology in the classroom).

([3]) https://docs.google.com/document/d/1j4_p7NypAivqYZa-O62ZDcbwNHEoCxiG/edit?usp=sharing&ouid=103062679054782458142&rtpof=true&sd=true

3. **Scale Scoring:** The three response categories were expressed quantitatively, with scores of 3, 2, and 1 given for the agree, not sure, and disagree responses, respectively.
4. **Validity of the Scale:** The validity of the scale was verified in two ways:

1) Honesty of the arbitrators: The scale was presented to the arbitrators and modified in light of their opinions.
2) Internal consistency validity: The internal consistency validity of the scale was calculated using the Pearson correlation coefficient by calculating the correlation coefficient of the score of each dimension with the total score of the scale, as shown in Table .(2)

Table (2): Dimensional Relationship Matrix for the Technology Integration Scale in the Classroom.

Dimensions	Satisfaction with the integration of technology into teachers' professional development	Satisfaction with the integration of technological applications into the classroom	Satisfaction with the reference tool for integrating technology into the classroom
Correlation coefficient	**0.851	**0.821	**0.814

** Significant at the 0.01 Level.

From Table (2) that the correlation coefficients between the scores of the scale dimensions and the total score of the scale are statistically significant at the level of (0.01), which indicates that the scale has a high degree of validity in what it was designed to measure.

5. Reliability of the scale: The stability of the scale was calculated using the Cronbach alpha method, where the stability of the sub-dimensions of the scale was calculated and the stability of the scale as a whole was calculated. Table (3) also shows that the scale has a high degree of reliability.

Table (3): Cronbach's Alpha Coefficient for the Dimensions of the Scale and for the Scale as a Whole

The dimension	Cronbach's alpha coefficient
Satisfaction with the integration of technology into teachers' professional development	0.690
Satisfaction with the reference tool for integrating technology into the classroom	0.711
Satisfaction with the integration of technology into the classroom	0.752
The measure as a whole	0.714

6. The final image of the scale: The scale contained (17) items, (6) statements related to satisfaction with integrating technology into the professional development of teachers, (6) statements related to satisfaction with the reference tool for integrating technology in the classroom, and (5) a statement related to satisfaction with Integrating technology into the classroom. In light of the arbitrators' suggestions, the necessary amendments were made and the scale became in its final form valid for applicationThus, the minimum score on the scale became (17) degrees, and the maximum score became (51) degrees on the link)[4]

(4)https://forms.gle/LXhFCht4EEhezQLR7

Third: Cognitive Test for Using the Assistant Application

- **The Goal of the Test:** to measure the effectiveness of the assistive application in developing the concepts and skills of the Pedagogical Applications Wheel to improve the integration of technology into teachers' classrooms.
- **Formulating the Test Vocabulary:** The test vocabulary was formulated in the form of objective questions, with the number of vocabulary words in its initial form reaching (23) items, including (10) true-false items, and (12) multiple-choice items.
- **Calculating the Coefficient of Difficulty:** ease, and discrimination for the test items: The coefficients of ease, difficulty, and discrimination were calculated for the test items and they fall in the range from 0.51 to 0.79, which are values that fall in the statistically acceptable range for the coefficient of ease and difficulty for the items. Also, the discrimination coefficient ranges from 0.26 to 0.32, which are values that indicate vocabulary ability. On discrimination and are statistically acceptable values.
- **Setting the Test:** to verify its validity and reliability and calculate the time required to perform it, as follows:
- **Validity of the Test:** The test was presented in its initial form to a group of arbitrators to ensure the veracity of the cognitive test and the measurement of its vocabulary for the cognitive content of the auxiliary application and the extent of the accuracy of the wording of its vocabulary. After making modifications, additions and deletions in light of the opinions of the arbitrators, the test's internal consistency validity coefficient was then calculated by calculating the correlation coefficient between The score for each item of the test and the total score for the test, as it was found that the correlation coefficient values exceeded (0.72), which indicates the validity of the cognitive test and its validity for application.
- **Test Stability:** Test stability was also calculated using the re-application method, and the correlation coefficient between the scores of the two applications was calculated and amounted to (0.90), which is a value that is statistically indicative of the test's stability and suitability for application. Thus, the test in its final form includes (20) items, and its maximum end is (20) degrees
- **The Final Form of the Test:** Amendments were made to the test vocabulary in light of the opinions of **the** arbitrators and the results of the exploratory experiment of the test, and the test became in its final form. As shown in the link [5]**)**

Fourth: Cognitive Flexibility Scale

The current research adopted the Cognitive Flexibility Scale for Aggression and Provincialism (2021), which consists of (25) items that aim to classify subjects into three levels according to cognitive flexibility (high - medium - low.**(**

The scores of the cognitive flexibility scale are extracted in light of the response scale to the scale items, with a five-point Likert scale, which ranged between (always, often, sometimes, rarely, never) for all items, as all items of the scale are positive and represent the highest score that the subject can obtain (125 degrees, while the lowest score that the subject can obtain represents (25) degrees, while the average of the scale represents (75) degrees. The adjusted range of these responses was for high (5.00-3.68), medium (3.67-2.34 ,**(**and low (2.33-1.00).

(5)https://forms.gle/ELHZrDqeXMMGKnfQ8

Fifth: Educational Design of the Auxiliary Application

The researcher reviewed many of the list of application design standards and application design models in many studies and literature related to them, such as Hassan's research (2019), Juma's research (2020), and the educational design reference model) ADDIE) .,(and the model) Tarasewich, 2015), and the use of the Reference Instructional Design Model (ADDIE) was combined,(and Hassan's (2019) model for designing and building plugin content using the Thunkable platformThese stages are summarized in:

1. Determine the standards and foundations for building the auxiliary application in light of the Pedagogical Applications Wheel) PW).(By looking at the Pedagogical Applications Wheel) PW(and its components, sectors, and the pedagogical principles based on it, and through reviewing previous studies that dealt with models and frameworks for employing and integrating technology in classrooms, the following foundations were identified on which the assistive application is based:

1) Technological applications are not an integral part of teaching skills, but rather an essential component of the teaching process as one of the twenty-first century skills that the teacher must have.
2) The teacher's integration of technology into the classroom requires not only familiarity with technological applications, but also requires knowledge of how to employ them in a way that suits behavioral goals, educational activities, and the nature of each educational content.
3) Improving the integration of technology into classrooms requires familiarity with educational principles, foundations, and technological applications to determine educational activities and their technological applications that are appropriate to the educational content.

1) Improving the integration of technology into classrooms requires raising the level of satisfaction among teachers toward these technological applications.
2. Instructional design for the auxiliary application: The researcher reviewed many application design models, such as the Reference Instructional Design Model (ADDIE) model (Tarasewich, 2015, (Hassan's model (2019), and Juma's model (2020). The Reference Instructional Design Model) ADDIE) was used(. To design and build plugin content using the Thunkable platformThe design stages according to this model are summarized in the following stages:

1- Analysis Stage: It included the following Stage

- Identifying the educational needs of teachers: which included their need to use Pedagogical Applications Wheel to improve the integration of technology into the classrooms of teachers (research sample) and develop their level of satisfaction.
- Analyzing the characteristics of parameters: by verifying the availability of educational foundations and concepts related to the use of the Pedagogical Applications Wheel.
- Analysis of the characteristics of the educational environment: It was ensured that a suitable mobile phone was available to download the auxiliary application, while learning resources related to the auxiliary application were designed and presented through the application built on the Thunkable platform.
- Analysis of educational activities and tasks: The educational tasks that teachers must accomplish to achieve the objectives of learning the auxiliary application, which are (studying the related educational concepts - the Pedagogical Applications Wheel (PW) .- (Steps to employ the wheel in the classroom - Criteria for selecting technological applications)

2- Design Phase: It included the following Stage

- Determining the general goal of the auxiliary application: which was to develop an auxiliary application for teachers to improve the integration of technology in the classroom as a reference tool for the teacher in determining the correct behavioral actions, associated educational activities, and appropriate technological applications for each of the educational goals within the classroom, using (Pedagogical Applications Wheel).,(and the procedural objectives were determined for each topic of the auxiliary application.
- Determining the content of the auxiliary application: The content was determined in light of the list of concepts and skills prepared by the researcher, as shown in Table (1)
- Identifying educational media: Learning sources, application screens, and educational multimedia were identified to display the content of the topics, and were represented in the main application screens, educational content screens, and access link screens for the various applications, with enrichment multimedia identified.
- Determine strategies for presenting the content of the auxiliary application: through electronic discussions, through creating a work group on the chat application, and self-learning.
- Determine evaluation tools: It includes a cognitive test and a satisfaction measure toward integrating technology into the classroom.

3- Production Stage: It included the following Stage

- Designing and compiling various digital learning resources, including texts, illustrations, videos, and PDF files.
- An application was created on the Thunkable website platform In (14) screens - see Appendix (4) ([6])- which are:

(1) Opening screen
(2) Main menu
(3) List of technological applications
(4) About the application
(5) Technology integration models
(6) .List of applications) Android)
(7) .List of applications) Apple)
(8) .App Wheel (Android)
(9) App Wheel (Apple)
(10) Remember/understand criterion
(11) Application standard
(12) Analysis standard
(13) Evaluation standard
(14) Creativity standard

4- Evaluation Stage

The validity of the auxiliary application was tested by presenting it to a group of arbitrators to verify its technological and pedagogical validity, and the required modifications were made. A reconnaissance application was also carried out to find out the teachers' opinions about the method of presenting the educational content. The researcher held a meeting with the teachers

([6]) https://drive.google.com/file/d/17v5AmqmpFXnf2rqvN_jJFLTvDvdNEdzp/view?usp=drive_link

(the research sample) and introduced them to the purpose of the auxiliary application and trained them. They learned how to download the application and navigate between the application screens, view the content learning resources and educational enrichment activities, and how to respond to the items of the cognitive flexibility scale, the cognitive test, the note card, and the satisfaction scale. They were also introduced to how to navigate between the auxiliary application screens.

The modification was made in light of the opinions of the arbitrators and the observations that appeared during the exploratory application, and thus the auxiliary application (the reference tool) became the final form. To carry out the research experiment.

Sixth: Research Experience

1- Determining the research sample: The research was conducted on a sample of (34) school teachers in the Asir region from various specializations. Training on the auxiliary application continued for three days:

a. The first day: Pre-tests and introduction to Pedagogical Applications Wheel
b. The second day, downloading the application on the respondents' Android devices and introducing them to the application's tools and methods of operating it.
c. Day three: Trying out the application and then conducting post-tests of the tools.

2- The first day: Pre-application of measurement tools, where the cognitive flexibility scale, the cognitive test, the observation card for the Pedagogical Applications Wheel, and the satisfaction scale among teachers were applied towards integrating technology in the classroom.
3- Application of the research experiment: according to the following steps:

A meeting was held with the research group to clarify the aim of the research, and the teachers were trained on how to navigate between the application screens, how to view the learning resources available in the content of the auxiliary application, and how to use the cognitive test and satisfaction scale.

4- Post-application of measurement tools: The measurement tools were applied post-test, and scores were monitored to be treated statistically.

Research Results, Analysis and Interpretation

(1) Result of the First and Second Questions

The first and second research questions were answered, each of which states: "What are the concepts and skills of using the (Pedagogical Applications Wheel) model necessary for the professional development of teachers with cognitive flexibility to improve the integration of technology in the classroom?", and the second, "What are the criteria for designing an auxiliary application for teachers with differences in cognitive flexibility?" Cognitive flexibility to use the Pedagogical Applications Wheel as a reference tool to improve the integration of technology in the classroom?" during the presentation of the theoretical part related to the research.

(2) Result of the Third Question and Verify the Validity of the First Hypothesis

To answer the third research question, which states" , What is the effectiveness of the design of the reference tool in developing the cognitive aspects of teachers (highly flexible -

moderately flexible - low flexible) towards improving the integration of technology in classrooms using the Pedagogical Applications Wheel?", and to verify the validity of the hypothesis. The first one states that "there are statistically significant differences at the level of significance (0.05) between the average scores of individuals in the experimental research groups (high - medium - low) cognitive flexibility in the cognitive aspects related to the Pedagogical Applications Wheel) PW) .To verify the validity of this hypothesis, the researcher used the alternative nonparametric test, the Kruskal-Walis Test.(in SPSS For the three experimental groups in the post-application of the cognitive test, the results were as shown in Table (4)

Table (4): Kruskal-Wallis Test Results"for the Research Sample Groups in the Post-Cognitive Test.

Experimental groups	number	Average rank	H value	Significance level	Effect size
High flexibility	23	26.36	16.041	*0.00	0.449
Medium flexibility	10	14.20			
Low flexibility	7	9.36			

*D at 0.05.

From Table (4) that there is statistical significance at the significance level (0.05), which confirms the presence of an effect of the level of cognitive flexibility among teachers in the post-application of cognitive aspects, as the value of) H(is equal to (16.041), and this indicates the presence of differences between groups, which necessitates conducting multiple post hoc comparison tests in order to verify the significance of the difference between each two means. To calculate this, the Mann-Winetti test was used for post hoc comparison between each of the two of the three groups, and the results were as follows:

- There are statistically significant differences between the group (high cognitive flexibility) and the group (average cognitive flexibility) because the significance value (0.02) is less than the significance level of 0.05, and the difference is in favor of the group (high cognitive flexibility) as its average ranks are greater than the average ranks of the (average) group. Cognitive flexibility).

- There are statistically significant differences between the group (high cognitive flexibility) and the group (low cognitive flexibility) because the significance value (0.01) is less than the significance level of 0.05, and the difference is in favor of the group (high cognitive flexibility) as its average ranks are greater than the average ranks of the group (low cognitive flexibility).

- There are no statistically significant differences between the group (average cognitive flexibility) and the group (low cognitive flexibility), because the significance value (0.230) is greater than the significance level of 0.05.

As is clear from the results shown in Table (4), the size of the effect of the reference tool on the cognitive aspects of teachers, as it was calculated using the Eta square and its value (0.449), and searching for its significance showed that this value expresses the large effect, as the large effect size appears when the value is Equal to or greater than (0.14).

This Result can be Explained according to the following Reasons

1. The reference tool provided teachers with educational content about Pedagogical Applications Wheel using a mobile phone so that the educational content could be viewed at any time and from anywhere according to the teacher's desire, readiness, and appropriate time for it. The educational content was also presented in a variety of multimedia forms that help to remember the cognitive content. Easily and conveniently depending on the different levels of cognitive flexibility of teachers.
2. The large impact on the cognitive aspects came as a result of the direct communication of the researcher, in addition to the chat group for the research experience for teachers, through the exchange of dialogue and group electronic discussion on the topics of the content of the reference tool, which made all teachers benefit from each other's experiences. It also facilitated communication between them and the researcher to exchange information and ideas and build knowledge, which sparked their motivation towards studying the reference tool, continuous and self-learning, and communicating among themselves.
3. The average rank of the results of teachers (high in cognitive flexibility) is higher than the rest of the groups as a result of the teaching experience possessed by the teachers of this group. As for the group of teachers (low in cognitive flexibility), the low results and their lack of statistical significance are explained by their lack of experience in teaching or integrating technology in the classroom, as they Recent graduates and appointments.

These results are consistent with the findings of (Al-Saidi et al., 2022, 32), and) Eman Aly,,(2022), Sabry (2019), Daniela(2021), Al-Anazi and Al-Shaddadi (2018), Al-Far and Shaheen (2017), Carrington2016).

(3) Result of the fourth question and verifying the validity of the second hypothesis

To answer the fourth research question, which states" : What is the effectiveness of the design of the reference tool in developing the skill aspects of teachers (highly flexible - moderately flexible - low flexible) towards improving the integration of technology in classrooms using the Pedagogical Applications Wheel?", and to verify the validity of the second hypothesis that It states that "there are statistically significant differences at the level of significance (0.01) between the average scores of individuals in the experimental research groups (high - medium - low) cognitive flexibility in the skill aspects related to the Pedagogical Applications Wheel) PW) . To verify the validity of this hypothesis, the researcher used the alternative nonparametric test, the Kruskal-Walis Test.(in SPSSFor the three experimental groups in the post-application of the note card, the results were as shown in Table 5.

Table (5): Kruskal-Wallis Test Results"for the Research Sample Groups in the Post-Observation Card.

Experimental groups	number	Average rank	H value	Significance level	Effect size
High flexibility	23	26.67	19.89	*0.00	0.584
Medium flexibility	10	17.25			
Low flexibility	7	4.86			

*D at 0.05.

From Table (5) that there is statistical significance at the significance level (0.05), which confirms the presence of an effect of the level of cognitive flexibility among teachers in the

post-application of cognitive aspects, as the value of) H(is equal to (19.89), and this indicates the presence of differences between groups, which necessitates conducting multiple post hoc comparison tests in order to verify the significance of the difference between each two means. To calculate this, the Mann-Winetti test was used for post hoc comparison between each of the two of the three groups, and the results were as follows:

- There are statistically significant differences between the group (high cognitive flexibility) and the group (average cognitive flexibility) because the significance value (0.013) is less than the significance level of 0.05, and the difference is in favor of the group (high cognitive flexibility) as its average ranks are greater than the average ranks of the (average) group. Cognitive flexibility.(

- There are statistically significant differences between the group (high cognitive flexibility) and the group (low cognitive flexibility) because the significance value (0.00) is less than the 0.05 level of significance, and the difference is in favor of the group (high cognitive flexibility) as its average ranks are greater than the average ranks of the group (low cognitive flexibility(.

- There are statistically significant differences between the group (average cognitive flexibility) and the group (low cognitive flexibility), because the significance value (0.003) is less than the significance level of 0.05.

From the results shown in Table (4), the size of the effect of the reference tool on the cognitive aspects of teachers, as it was calculated using the Eta square and its value (0.584), and searching for its significance showed that this value expresses the large effect, as the large effect size appears when the value is Equal to or greater than (0.14).

This Result can be Explained According to the following Reasons

The reference tool allowed teachers to improve their teaching skills by using technology and using Pedagogical Applications Wheel through the mobile phone so that the educational content could be viewed at any time and from anywhere according to the teacher's desire, readiness and appropriate time. These skills were also trained in various forms of multimedia. It helps to remember the cognitive content easily according to the different levels of cognitive flexibility of the teachers.

The large impact on the skill aspects of the teachers came as a result of what the direct communication of the researcher, in addition to the chat group for the research experience for the teachers, allowed for the exchange of dialogue and group electronic discussion on the topics of the content of the reference tool, which made all the teachers benefit from each other's experiences. It also facilitated communication between them and the researcher to exchange information and ideas and build knowledge, which sparked their motivation towards using the reference tool, continuous and self-learning, and communicating among themselves.

The average rank of the results of teachers (high in cognitive flexibility) is higher than the rest of the groups as a result of the teaching experience possessed by the teachers of this group. As for the group of teachers (low in cognitive flexibility), the low results and their lack of statistical significance are explained by their lack of experience in teaching or integrating technology in the classroom, as they Recent graduates and appointments.

These results are consistent with the findings of the researchof Sabry (2019), Al-Ashqar (2021), Ali (2020), Khaled and Radi (2021), and Abdul Hamid (2020).

(4) Result of the Fifth Question and Verifying the Validity of the Third Hypothesis

To answer the fifth research question, which states" : What is the effectiveness of the design of the reference tool in developing the level of satisfaction among teachers (high flexibility - medium flexibility - low flexibility) towards improving the integration of technology in the classroom using Pedagogical Applications Wheel?", and to verify the validity of the third hypothesis that It states that "there are statistically significant differences at the level of significance (0.05) between the average scores of the members of the experimental research groups (high - medium - low) cognitive flexibility in developing the level of satisfaction among the research group towards integrating technology in the classroom using Pedagogical Applications Wheel to verify the validity of this hypothesis, the researcher used the nonparametric Kruskal -Walis Test.(in SPSSFor the three experimental groups in the post-application of the satisfaction scale, the results were as shown in Table (6).

Table (6): Kruskal-Wallis Test Results"for the Research Sample Groups in the Post-Test Satisfaction Scale.

Experimental groups	number	Average rank	H value	Significance level	Effect size
High flexibility	23	25.70	11.321	*0.00	0.329
Medium flexibility	10	15.10			
Low flexibility	7	11.14			

*D at 0.05.

From Table (6) that there is statistical significance at the significance level (0.05), which confirms the presence of an effect of the level of cognitive flexibility among teachers in the post-application of cognitive aspects, as the value of) H(is equal to (11.321), and this indicates the presence of differences between groups, which necessitates conducting multiple post hoc comparison tests in order to verify the significance of the difference between each two means. To calculate this, the Mann-Winetti test was used for post hoc comparison between each of the two of the three groups, and the results were as follows::

- There are statistically significant differences between the group (high cognitive flexibility) and the group (average cognitive flexibility) because the significance value (0.011) is less than the significance level of 0.05, and the difference is in favor of the group (high cognitive flexibility) as its average ranks are greater than the average ranks of the (average) group. Cognitive flexibility).
- There are statistically significant differences between the group (high cognitive flexibility) and the group (low cognitive flexibility) because the significance value (0.006) is less than the significance level of 0.05, and the difference is in favor of the group (high cognitive flexibility) as its average ranks are greater than the average ranks of the group (low cognitive flexibility).
-There are no statistically significant differences between the group (average cognitive flexibility) and the group (low cognitive flexibility), because the significance value (0.325) is greater than the significance level of 0.05.

From the results shown in Table (6), the size of the effect of the reference tool on the cognitive aspects of teachers, as it was calculated using the Eta square and its value (0.329), and searching for its significance showed that this value expresses the large effect, as the large effect size appears when the value is Equal to or greater than (0.14).

This Result can be Explained according to the following Reasons

1- The reference tool provided teachers with educational skills on using Pedagogical Applications Wheel on the mobile phone so that the educational content could be viewed at any time and from any place according to the teacher's desire, readiness, and appropriate time. These skills were also trained in various forms of multimedia to help remember. Cognitive content easily and conveniently according to the different levels of cognitive flexibility of teachers.

2- The large impact on the skill aspects of the teachers came as a result of what the direct communication of the researcher, in addition to the chat group for the research experience for the teachers, allowed for the exchange of dialogue and group electronic discussion on the topics of the content of the reference tool, which made all the teachers benefit from each other's experiences. It also facilitated communication between them and the researcher to exchange information and ideas and build knowledge, which sparked their motivation towards studying the reference tool, continuous and self-learning, and communicating among themselves. These results are consistent with the results of the research of Al-Ahmad (2023), Al-Khasousi and Abdel-Moneim (2023), Al-Sharafat (2023), and Al-Ruwaili. Al-Rifai (2017).

3- The average ranks of the results of the teachers (high in cognitive flexibility) were higher than the rest of the groups as a result of the teaching experience possessed by the teachers of this group, with no differences between the two groups (average cognitive flexibility) and (low cognitive flexibility).

(5) Result of the Sixth Question and Verifying the Validity of the Fourth Hypothesis

To answer the sixth research question: "What is the correlation between the availability of concepts and skills for using the Pedagogical Applications Wheel) PW(And the level of satisfaction among teachers towards integrating technology into the classroom? And to verify the validity of the fourth hypothesis: which states: "There is a positive correlation between the average scores of the cognitive and skill aspects and the level of satisfaction towards integrating technology into the classroom using the Pedagogical Applications Wheel) PW) model.").

To test the validity of this hypothesis, the researcher studied the correlation coefficient between the research variables (the cognitive test and the satisfaction scale) by calculating the rank correlation coefficient (Spearman = r).) (as non-parametric analysis methods were used due to the small number of sample members) and the statistical significance of the correlation coefficient was calculated, as shown in Table (10:(

Table (10): Correlation Coefficients between the Results of the Cognitive Test, the Observation Card, and the Satisfaction Scale in the Post-Application.

Research variables	Cognitive test	Note card	Satisfaction scale
Cognitive test	*1.00	*0.660	*0.456
Note card	*0.660	*1.00	*0.693
Satisfaction scale	*0456	*0.693	*1.00

** Significant at the 0.05 Level.

from the previous table: There is a statistically significant direct correlation at the 0.05 level between teachers' possession of the concepts and skills of using the Pedagogical Applications Wheel and the level of satisfaction towards integrating technology in the classroom.

Accordingly, the hypothesis is accepted, which means that there is a positive correlation between the availability of concepts and skills. The use of Pedagogical Applications Wheel and the level of satisfaction towards integrating technology into the classroom.

The researcher explains this by providing the concepts and skills for the teacher to use Pedagogical Applications Wheel, making him have a level of satisfaction towards integrating technology in the classroom, which increases the teacher's motivation towards employing various technological applications, and also makes him have the ability to overcome the obstacles faced while employing technology in the classroom and research. About solutions to these obstacles, and this is confirmed by the results of many studies, such as the research of Mostafa (2022) and Dahi and Ahmed (2022).

Researcher Recommendations

From results of this research, the researcher recommends the following:

1. Developing educational and technological curricula in colleges of education, including standard models and frameworks for integrating technology into classrooms.
2. Developing professional training programs for in-service teachers, including standards and steps for using standard models and frameworks for integrating technology into classrooms.
3. Providing a technological structure in classrooms that helps improve the integration of technology during the teaching process.
4. Training teachers on how to use the Pedagogical Applications Wheel in each of the academic courses, each in their specialty, to improve the integration of technology into the classroom.
5. Training teachers on various technological applications, how to use them, and how to overcome the obstacles they may face while integrating them into classrooms.
6. Developing reference tools for teachers in each model of integrating technology into classrooms and applying them to teachers
7. Continuous development (annually) of technology application reference tools to improve the integration of technology into the classroom.

Proposed Studies and Research

From results of this research, the following studies and research can be proposed:

1. Study the effectiveness of an adjunct application based on other models and frameworks for integrating technology into classrooms to develop technology skills and teaching practices.
2. A study of the evaluation of professional and teaching performance and the level of satisfaction of teachers in light of the use of Pedagogical Applications Wheel.
3. Studying the foundations of developing teacher preparation programs in colleges of education in light of Pedagogical Applications Wheel.
4. Studying the attitudes and level of satisfaction of teachers towards integrating each technological application into the classroom.
5. Studying the development of reference tools for teachers in each model of integrating technology into classrooms and applying them to teachers
6. Studying the effectiveness of using technological applications in developing teaching variables and other thinking skills to improve the integration of technology in the classroom.

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