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# The effect of different sharing patterns through multiple electronic approaches on developing information awareness and social interaction skills among students of the University of Hail

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ABSTRACT

The current research aims at identifying the effect of different patterns of sharing in the electronic learning environment on developing information awareness and social interaction skills among students of the University of Hail. The research sample consisted of 18 students from the Department of Computer Science at the Community College-University of Hail, who was chosen and distributed randomly on three groups, the researchers designed the participatory e-learning environment model, and in light of the activity theory. The research experiment lasted three weeks. The students of the three groups studied the proposed scientific content through the "Black Board" learning management system, then the students performed an activity participatory implementation of the activities and tasks of the scientific content through the use of a cooperative learning strategy, with a different style of participation, as the first group students participated in the synergistic sharing pattern through the Web 2.0 tool (Twitter), and the second experimental group students with the parallel sharing style through the Web 2.0 tool (Video Sharing), and the students of the third experimental group in the style of sequential sharing through the Web 2.0 tool (Wiki). The results showed the effectiveness of the three types of participation (synergistic-parallel-serial) in developing information awareness and social interaction skills in favor of post-performance. On the other hand, the two modes of participation (synergistic and sequential) were superior to that of (parallel) in the development of cognitive achievement of information awareness. More Attention should be considered in designing and producing digital courses based on participatory learning systems.



## 1. Introduction

Technological changes in the field of technology have led to the emergence of new patterns of teaching and learning, which further entrench the concept of individual education; Where the learner can learn according to his abilities and according to his speed of learning, and based on his previous experiences and skills. E-learning is one of these advanced patterns, which have had the greatest impact on bringing about positive changes and developments on the way students learn, methods and methods of communicating scientific information to them, as well as on the content and form of curricula (Shahzad et al., 2020).

As a result of the emergence of technological innovations and their positive developments, educational systems sought the necessity of creating educational approaches that meet the requirements of learning, which is learning that transcends temporal and spatial constraints and takes into account the needs of individuals and individual differences between them, and learners are active participants in the production of learning and are not passive consumers of content, so learning is a participatory social process that supports Individual goals and needs (Alsaqri et al., 2018).

Hence the importance of the participatory learning environment and the active, active and positive role of the learner during the teaching and learning processes, which helps in the process of transformation from the teaching model to the learning model through the discovery, construction, and production of knowledge and increases the

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interests of learners and their motivations for learning (Ismaile and Alhosban, 2018). Participatory learning is defined as "a learning system through the computer and the Internet, through which the work is divided into sub-tasks that the team members carry out from the learners, as they work in small groups who share the task, and therefore it focuses on generating knowledge, not receiving it (Blayone et al., 2017), and in the same context, Zainol and Almukadi (2020) emphasized, that "participatory learning in which students learn together from each other through participatory groups using support tools through the Internet to achieve higher levels of thinking. The concept of participatory learning can be illustrated through Fig. 1.

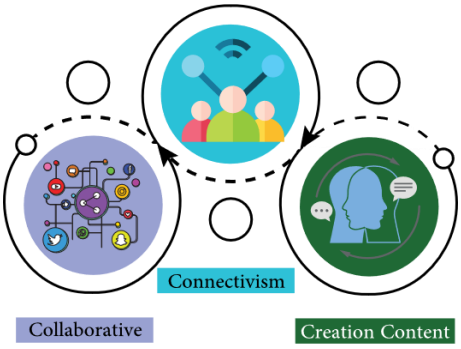


**Fig. 1:** The concept of participatory learning

The methods of participation in the current research are intended to learn through the three modes of participation (synergistic-parallel-serial) through Web 2.0 tools (Twitter-Video Sharing-Wiki), to develop information awareness and social communication skills.

Adu-Gyamfi et al. (2020), Yueh et al. (2015) indicated that sharing learners with each other reduces isolation, helps develop thinking skills, and contributes to forming positive reactions in them. With different styles of participation, individual learner and learners through e-learning platforms as they are content with watching only, which may affect their learning outcomes, and those studies also showed that sharing between teacher and learner without teacher guidance through participatory web editors contributes to a decrease in interaction between learners, and the following format explains the differences between the roles of the teacher and the learner in the traditional learning environment and the participatory learning environment. It also illustrates the responses of the active learner in the participatory learning environment in the transfer and exchange of knowledge with colleagues as is shown in Fig. 2.

It is noted from Fig. 2 that the participatory learning environment is one of the important learning environments, as it provides an integrated learning environment, aiming at participatory electronic learning that allows the exchange of knowledge and information between learners, as it is a dynamic, participatory process centered on the learner and the teacher's role in it is a guide and directed.

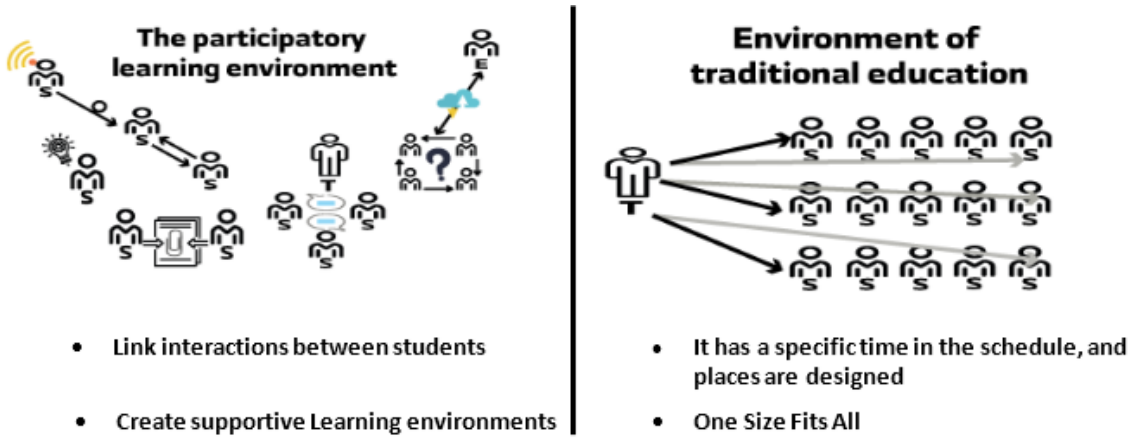


**Fig. 2:** The difference between the traditional learning environment and the participatory learning environment

In this regard, many studies have addressed the importance of using web tools in a participatory learning environment, including Onbasili (2020), Zainol and Almukadi (2020), Gursoy and Goksun (2019), and Wang and Hwang (2012) confirmed the effectiveness of using Web 0 tools. 2 in participatory e-learning environments, and its importance in facilitating the process of information exchange and sharing, in addition to its distinctiveness in interactivity and flexibility that would transfer education to learning, and make the learner a receiver, sender, interactive and participant, not just a future and a passive recipient. It also contributes to making the learning, cooperative and integrative among the learners, as everyone participates in editing, publishing, adding, and commenting. Fig. 3 shows the most important web 0.2 used in a participatory learning environment.

It is worth noting that the availability of a participatory style in the learning environment via the web contributes to providing an appropriate environment for the exchange of resources, information, knowledge, and experiences among the learners participating in all educational activities, which may contribute to improving the participants' understanding of knowledge and increases their abilities to apply it in new situations. As well as developing some skills to develop and develop

methods of expression and communication with others through text and images and higher thinking skills they have (Alsaqri et al., 2018).

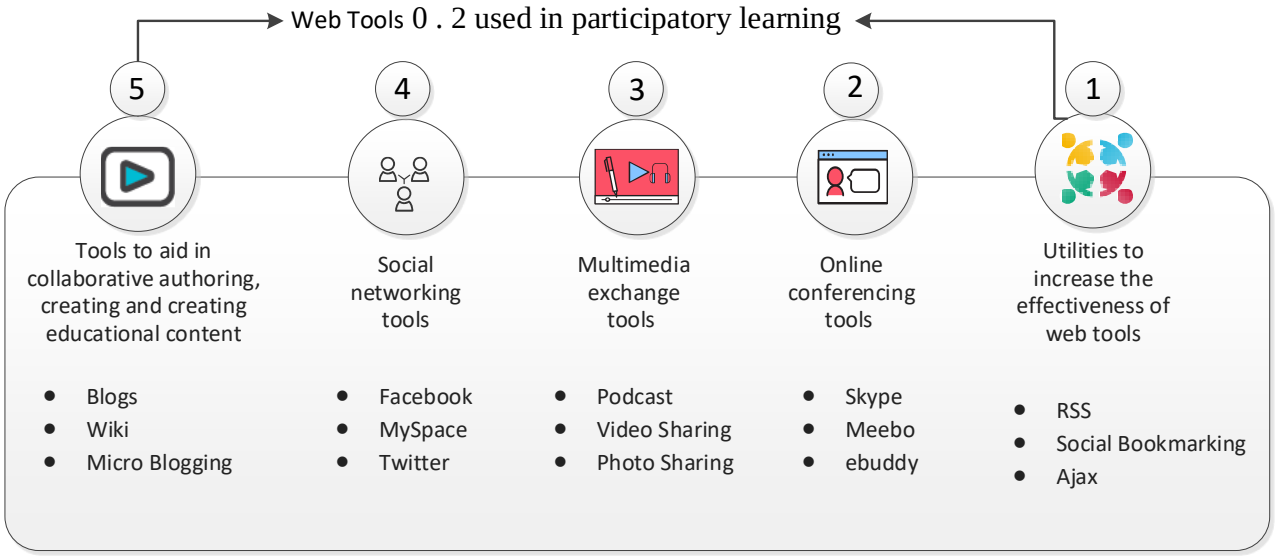


**Fig. 3:** Examples of Web 2.0 tools, used in participatory learning

Alshamari and Aichouni (2020) also emphasized that electronic learning environments via the web are fertile ground for the growth of the participatory learning environment and its effective construction, as it provides an opportunity for social presence for participatory learning through some available participatory tools that can be exploited and employed in light of learning Participatory, given that this type of learning is based on the exchange of information between groups of learners, they participate together in formulating discussions and reorganizing concepts to build new relationships between them, as well as receiving feedback and evaluation through the rest of the group members.

The studies that used patterns of electronic participation or some of them in general and the accompanying educational applications have also indicated the development of thinking skills, problem-solving skills, critical thinking, participatory skills, electronic communication skills, and self-efficacy, as well as the development and increase of students' ability to achieve Academic (Zainol and Almukadi, 2020; Alshamari and Aichouni, 2020).

There are several types of sharing patterns in e-learning environments, including the synergistic pattern, in which all students work together collaboratively on the same task at the same time. It is reported that the synergistic sharing pattern shows the advantages of participatory teamwork more. Which contributes greatly to achieving a balance between personal interests and collective goals (Heinimäki et al., 2020). There is also a parallel participatory model, in which the participatory activities are divided into a set of sub-tasks, and distributed among the members of the participatory team, where all the members perform their tasks at the same time and the final assembly of all tasks is done after a specified time. This style is characterized by defining a common goal or purpose. There is also a sequential pattern of sharing: which is the division of educational content into main tasks, then dividing them into sub-tasks so that each student works on a sub-task and after his completion completes the next student and so on ..., and in the end, the result is joint university work (Hadwin et al., 2018).

In light of the foregoing, the researchers see that the previous three types of participation differ in terms of interactivity and the way students perform their tasks at the same time, as well as the tools for providing educational content that supports the learning process. We find that the synergistic participation pattern aims to divide activities into tasks so that they cooperate and collaborate. All students in performing each task together; As for the parallel sharing pattern, the participatory activity is divided into a group of tasks, which are distributed among the members of the participatory team where all the members perform their tasks at the same time, and also the sequential pattern, so the tasks are divided among the team members where each student works on the task for a specific time, then it is transferred The assignment is given to the next student after a specified time to complete it, and in the end, the result is participatory group work.

There are many studies and research that have dealt with these different types of electronic participation in learning environments via the web and their effectiveness, such as Saborit et al. (2016) concluded that the effectiveness of patterns of participation in electronic learning environments is measured by the amount of collective help and support that they provide to the learner in the educational environment based on the web, as these patterns work on the growth of student competencies through an active and rich participatory learning environment and the study of

Adu-Gyamfi et al. (2020), which indicated the importance of participatory learning in sharing and building knowledge among students using modern technological means.

Whatever the pattern of participation in the e-learning environment, it is necessary for its design or presentation to be based on one or more approaches to learning theories, and there is no doubt that the proper selection of teaching approaches and educational theories through which the technique of e-participatory learning is employed is more important than choosing and design the same different participatory patterns. The link between theory and practice in designing and developing patterns of participation within e-learning environments is also important. Among these theories, activity theory developed by Vygotsky (1978), which can be used as a theoretical basis for explaining the processes of participation within the participatory e-learning environment through the seven elements of the theory, namely: Subject, to be determined from the parties participating in the activity, Tools: Include identifying theories, methods, resources, support tools and online environments and participatory activity, Object which is expected to educational and cultural products produced through the implementation of activities, Community social context in which activity occurs. Rules, implicit and explicit rules and standards that restrict activity in the community, Division of Labor Defining the horizontal and vertical roles and relationships within the community that influences the division of the mission, Outcome is the result of transforming educational objects into the educational products produced as it is shown in Fig. 4.

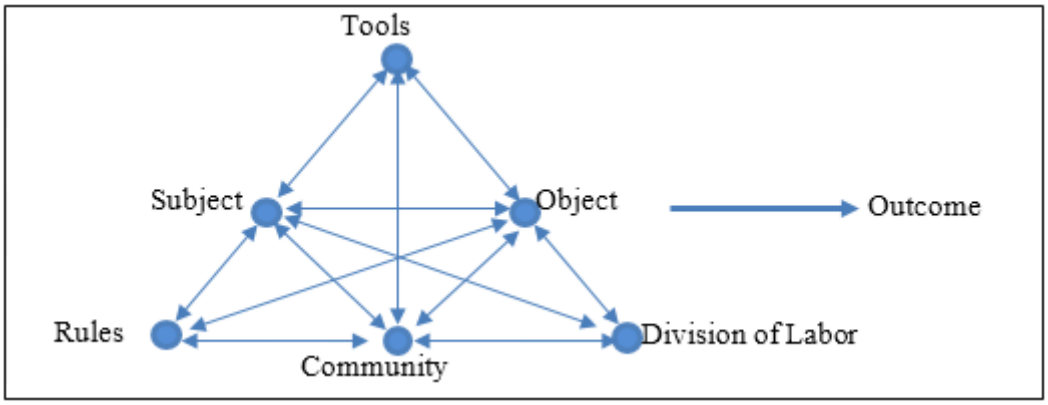


**Fig. 4:** The main elements of activity theory (Karasavvidis, 2008)

According to this theory, participatory work can be presented and implemented, and individual work can be transformed into group work according to rules for organizing and dividing work and tasks among students, and according to the seven components of the activity theory, participatory activity is performed, as (goal, topic, tools, community) are the main elements that Through it, the activity procedures are determined, and according to them (rules are set, work is divided) that lead to the performance of the activity operations.

In this regard, many studies have been conducted, such as Shahzad et al. (2020), Bolatli and Korucu (2018), and Yueh et al. (2015) on participatory learning in e-learning environments, and these research and studies have proven the effectiveness of using participatory interaction patterns in increasing motivation, cognitive growth, and understanding among students. Sharing is a vital and effective component in learning environments based on the Web, as these studies have shown that patterns of electronic participation helped students get a high level of achievement. These studies also emphasized the provision of support to learners during the implementation of educational tasks, as it provides them with support and assistance when they need it, and according to learning conditions.

It is evident from the previous presentation that there are many studies that have confirmed the effectiveness of each type of sharing separately, but these studies did not prove the effectiveness of whether the pattern of synergistic sharing is better than the pattern of synergistic sharing or the pattern of parallel sharing or vice versa, but some studies It recommended the necessity of disclosing which of them is better in developing information and knowledge for the educational content due to the different interactions that occur between students when learning the concepts and tasks in each of them, and that these studies and research have dealt with one or more patterns and focused on measuring its effectiveness, and this research did not compare these Patterns, and did not specify an appropriate order for their effectiveness, and that research did not address their use in web-based learning environments, while the educational designer wants to know the most effective pattern in order to use it to provide the necessary assistance and guidance to students, with the aim of enabling them to achieve the required learning outcomes.

The current research applies patterns of participation in participatory electronic learning environments to develop information awareness and social interaction skills among students of the Department of Computer Science, Community College-University of Hail, as students need

participatory patterns of interaction (synergistic-parallel-serial) in participatory electronic learning environments. In this regard, several studies have dealt with the impact of participatory e-learning on the development of information awareness and social interaction skills, including:

Yueh et al. (2015) emphasized the importance of participatory e-learning in developing social interaction skills and information awareness among elementary school students, where 32 sixth grade students judge the promising ideas of their community, during an experiment that develops a virtual social environment as a simulation of the environment. The results of the content analysis indicated that sixth-graders could improve their informational and social skills collectively by contributing diverse ideas, negotiating the appropriate, and generating questions through participatory patterns in participatory e-learning environments.

Ivlev et al. (2016) aimed to study the horizons of the humanistic approach to understand the essence of the relationships between a topic and another topic in the communication space of the information society using participatory e-learning. The sample of the study consisted of 20 male and female students. The sample was divided into two groups, the first experimental study using participatory education programs, and the control group in the normal way. The results of the study showed statistically significant differences in favor of the experimental group, as it was found to increase the skills of social communication and participation using participatory e-learning.

Krtalic et al. (2016) also aimed to uncover the impact of e-learning programs, participation, and different patterns of interaction on making citizens actively work in the information society in addition to developing their awareness, responsibility, attitudes, and activities that they undertake to preserve their collective digital heritage. The results showed students' high capabilities in terms of understanding the humanities and social sciences and understanding their own digital heritage, in addition to raising the ranks of their efforts to manage and archive it using participatory and collaborative e-learning strategies and practices.

The researchers believe that information awareness depends mainly on the cognitive structure of the recipient, as informational awareness is defined as “the skills of solving informational problems represented in inquiries or requesting information or data on a topic, and these skills are to determine when the information is needed, and how to obtain it from The best and fastest resources, then how to use them effectively and employ them to their desired extent. Social interaction skills are also a basic requirement for everyone who works with others in the same organization or other organizations. Through his interaction, the individual learns many patterns of behavior that he must follow. These skills are an essential part of the interactions of individuals in any social situation, as the individual always and involuntarily makes perceptions about others' personal characteristics, their attitudes, their intentions, and the reasons for their behaviors, and these perceptions that the individual creates have importance in adapting them to the social environment.

In view of the importance of the topics of information awareness and social interaction skills, their effective and professional acquisition is an important matter that helps students to work and learn in a social environment rich in cooperation and sharing. That is why the development of information awareness and social interaction skills among students of the Computer Science Department at Community College-University of Hail is important.

Therefore, there is a need to determine which of the three participatory patterns is most appropriate, according to the activity theory in developing information awareness and social interaction skills among students of the Computer Science Department at Community College - University of Hail.

## 2. The research problem

Researchers summarized the research problem through the following themes:

- Researchers have noted the low level of information awareness, interaction, and social communication skills between students and one another and between them and faculty members. Researchers have also concluded that there are difficulties regarding this and that they must be overcome in order to achieve the following:
  - Take advantage of opportunities for interaction, sharing, and exchange of multiple and varied views of the rest of the learners with diverse backgrounds.
  - Developing information awareness skills by involving students in integrated research processes, evaluating information sources, making judgments, and evaluating various information sources.
- To ascertain the research problem, the researchers conducted personal interviews (unregulated) and conducted an exploratory study on a sample of 15 students from the Computer Science Department at the Community College-Hail University (outside the basic research sample) on the use of "Web 2.0 " tools, (Twitter-Video Sharing-Wiki), and the BlackBoard learning management system in the learning process as well as their tendency to participate and interact through these tools.
- It became evident from the results of the personal (unstructured) interviews and the exploratory study that most students do not have a personal account on a Web 2.0 tool. Likewise, the majority

did not study any of the educational courses through the Blackboard Learning Management System, as well as they could not work in groups or work teams, and it was difficult for them to accept views and that they were not cooperating with their colleagues, and from here the researchers made sure that the research problem exists, and that an educational approach must be followed. A conversation that focuses on student active learning and works to develop the skills of communication, cooperation, and interaction with others, and to effectively integrate the technological communication and interaction tools that students use in their lives, but which they did not address in their academic work.

Thus, it becomes clear to researchers, the need to use and employ the three modes of participation (synergistic-parallel-serial) in participatory e-learning environments and through Web 2.0 tools (Twitter-Video Sharing-Wiki). To provide students of the University of Hail with the skills of information awareness and social interaction, and accordingly, the research problem can be formulated in the following main question:

- What is the effect of the different patterns of participation in multiple electronic approaches on the development of information awareness and social interaction skills among students of the University of Hail?

From this main question the number of sub-questions is divided as follows:

1. What are the information awareness skills needed to be developed among students of the Computer Science Department at Community College-University of Hail?
2. What are the social interaction skills required for the research sample students to develop?
3. What is the effect of the different patterns of participation within groups (synergistic-parallel-serial) in the participatory e-learning environment on the development of the cognitive achievement of information awareness among the students of the research sample?
4. What is the effect of different patterns of participation within groups (synergistic-parallel-serial) in the participatory e-learning environment on the development of social interaction skills of the students of the research sample?

## 3. Research objectives

The current research has sought to achieve the following objectives:

1. Detecting the effect of using each type of participation within groups (synergistic-parallel-serial) in the participatory e-learning environment on the post-measurement of cognitive achievement of information awareness and social interaction skills.
2. Measuring the effect of the difference between the three types of participation (synergistic-parallel-serial) within workgroups in the participatory e-learning environment on the development of cognitive achievement of information awareness and social interaction skills.
3. Identify the effectiveness of patterns of participation in the e-learning environment on academic achievement in the topics of information awareness and social interaction skills.

## 4. Importance of research

The importance of the current research is evident in its benefit in several aspects, which can be presented as follows:

1. Shedding light on the importance of information awareness and social interaction skills.
2. Employing modern technologies in the teaching and learning processes in order to improve the educational level of students.
3. Equipping educational designers in e-learning environments with new tools and sharing patterns.

## 5. Research variables

### 5.1. Independent variable

Patterns of participation within groups in the participatory e-learning environment, namely:

- Synergistic sharing pattern
- Parallel sharing pattern
- The pattern of serial sharing

### 5.2. Dependent variables

- Cognitive skills for information awareness
- Social interaction skills

### 5.3. Research sample

A random sample of 18 students of the second level of the Computer Science Department at the Community College-University of Hail was selected, and they were divided into three groups, each group has 6 students, where the first group is committed to implementing learning activities using the pattern of synergistic participation and through Web 2.0 tool (Twitter), while the second group carried out learning activities using the parallel sharing mode, and through the Web 2.0 tool (Video Sharing), and the third group carried out learning activities using the parallel sharing mode, and through the Web 2.0 tool (Wiki).

### 5.4. Research methodology

The researchers used the developmental research methodology for adopting an educational design model commensurate with the patterns of participation in the participatory e-learning environment, in addition to the descriptive and analytical approach in describing and analyzing the literature related to the research problem, describing and building measurement tools, as well as interpreting and discussing the results. The quasi-experimental approach was also used to identify the impact of Independent variables over dependent variables.

### 5.5. Experimental design for research

The experimental design was followed for three experimental groups, and Table 1 illustrates the experimental design of the research.

**Table 1:** Research experimental design

| Groups | Pre-analogy | Experimental processors | Telemetry |
|---|---|---|---|
| The first experimental group | Achievement test to measure the cognitive aspect<br>The scale of social interaction skills | Study the educational content (information awareness - social interaction skills) through the Blackboard Learning Management System, and use the synergistic engagement pattern through the Web 2.0 tool (Twitter) | Achievement test to measure the cognitive aspect<br>The scale of social interaction skills |
| The second experimental group | | Studying educational content (information awareness - social interaction skills) through the Blackboard learning management system, and using the parallel sharing pattern through the Web 2.0 tool (Video Sharing) | |
| The third training group | | Study the educational content (information awareness - social interaction skills) through the Blackboard Learning Management System, and the use of the serial sharing pattern via the Web 2.0 tool (Wiki). | |

### 5.6. Research limits

The current research is limited to:

- The second-level students, Department of Computer Science, Community College-University of Hail, are 18 students.
- Use the Kaplan (2002) model to design a participatory learning environment.
- Use the following three co-modes (Serial-Parallel-Serial).
- Using Web 2.0 tools (Twitter-Video Sharing-Wiki).

### 5.7. Research hypotheses

- There are statistically significant differences at the level of 0.05 between the mean scores of the grades of the three research groups in the participatory learning environment (synergistic-parallel-sequential) in the post-application by examining the cognitive achievement of informational awareness
- There are statistically significant differences at the level of 0.05 between the averages of the scores of the students of the three research groups in the participatory learning environment (synergistic-parallel-sequential) in the post-application of measures of social interaction.

### 5.8. Research tools

1. An achievement test to measure cognitive achievement related to information awareness.
2. Social Interaction Scale (Researchers' Preparation).

### 5.9. Research plan

The Research will proceed according to the following steps:

- Access to educational literature, studies, and previous research related to research variables in order to benefit from them for preparing experimental treatments and designing research tools.
- Determine the appropriate educational content to present the research variables, which are (information awareness) and (social interaction skills).
- Analyzing some Web 2.0 tools and selecting appropriate tools for search variables, namely
- Twitter-Video Sharing-Wiki.
- Set up search tools: A cognitive achievement test and a measure of social interaction skills
- Conducting the exploratory research experiment on 15 students in order to ensure the reliability and validity of the tools in addition to determining the test time, and to know the difficulties that researchers face during the application of the basic experiment and then overcome it
- Conducting the basic research experiment on the research sample of 18 students and applying the tools in dimension
- Monitor students' grades before and after
- Conducting a statistical treatment of the results, using the statistical program (SPSS).

### 5.10. Research terms

- Participatory learning: The researchers define it procedurally as a group learning method between two or more learners in a participatory electronic learning environment using Web 2.0 tools, to perform a set of activities, and the teacher organizes the process of participation and directs students to carry out these activities.
- Synergistic sharing style: The researchers define it procedurally as “the division of activities into tasks. All group members collaborate in carrying out the tasks together, and in the end, the final participatory product is assembled.

- Parallel sharing pattern: Researchers know it procedurally, dividing activities and tasks between students into a set of tasks and sub-activities in parallel so that the nature of the tasks allows students to perform their tasks at the same time, and the final assembly of the product takes place after a specified time.
- Sequential sharing pattern: Procedurally, researchers define it as: Divide the tasks in a sequential manner among the students, so that these tasks are sequential, sequential, and complementary to each other, and each student performs the task assigned to him within a specific time, then assigns another student to this task, and in the end the collective work of all students.
- Informational awareness: It is defined procedurally by researchers as the ability of students to perceive the need for information and to acquire the skills to search for and access information through various technical skills.
- Social interaction skills: The researchers define it procedurally as the students' ability to communicate with their colleagues in learning, extend a helping hand to them, control emotions and cooperation skills among them to perform educational activities in a positive, effective, and straightforward manner, and it was measured procedurally by the degree obtained by the student on the scale of social interaction skills that was developed to achieve this purpose.

### 5.11. Research procedures

In the following, the researchers discuss the procedures that were followed in designing experimental treatments (synergistic participatory style educational content) (parallel sharing pattern educational content) (serial participatory educational content) in participatory e-learning environments via the web to develop information awareness and social interaction skills among students of the Department of Science Computer at the Community College-University of Hail, and researchers have followed the Kaplan participatory e-learning model, and this model consists of five main stages, as shown in Fig. 5.

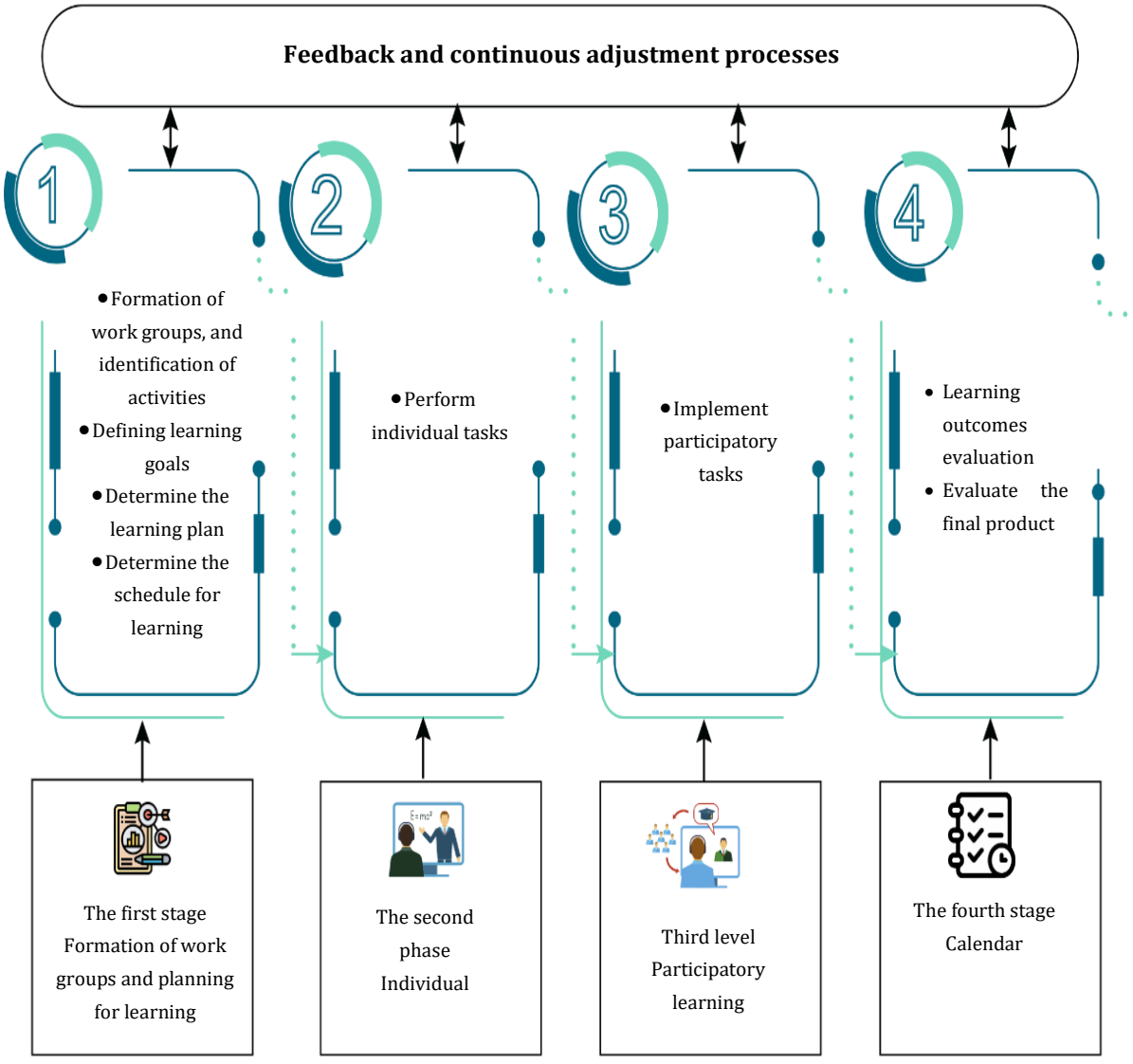


**Fig. 5:** Kaplan's participatory e-learning model (Kaplan, 2002; Karasavvidis, 2008)

The researchers made some adjustments to the stages included in the model, to match the nature of the research, and these stages can be presented as follows:

1. The first stage

- Formation of workgroups and learning planning: The researchers identified the main activity for learning, which is the content of informational awareness and social interaction skills, as well as 18 students were divided into three working groups, each group including 6 students so that each working group performed tasks and activities through a different pattern of participation as follows:

  - First experimental group: Studied the educational content of the awareness of the informational and social interaction skills through learning management system blackboard and then the activity of participatory Synergistic through Web 2.0 tool (Twitter).
  - The second group: She studied educational content for information awareness and skills for social interaction through the Blackboard learning management system, then did the parallel participatory activity through the Web 2.0 (Video Sharing) tool.
  - Third experimental group: She studied educational content for informational awareness and skills for social interaction through the Blackboard learning management system, and then conducted a participatory serial activity through the Web 2.0 tool (Wiki).

- Defining learning goals: Learning objectives have been defined in 10 main general objectives for scientific content (informational awareness, social interaction skills), and measurable behavioral goals have been set, which are (thirty) educational objectives that accurately describe the behavior of the learner and the behavior is measurable and observable, and the goals can be defined. General learning is as follows:

  - Information awareness content objectives, including the following:

    - Information access skills
    - Skills of organizing and analyzing information
    - Information application skills
    - University work skills and knowledge sharing
    - Information evaluation skills

  - Social interaction content goals:

    - Communication skills with others
    - Collaboration skills
    - Helping skills
    - Emotional control skills
    - Driving skills

- Defining the learning plan: The learning plan includes the following:

  - Determining the basic structure, which includes the tools where the Blackboard Learning Management System was used with the capabilities it provides to manage the educational process and the scientific content has been uploaded, in addition to a link to Web 2.0 tools (Twitter-Video Sharing-Wiki).

- Setting the basic map of the course:

  - The flowchart is designed to prepare an integrated diagram with symbols and geometric shapes to illustrate the method of learning with the three participatory patterns, in addition to the links and tools used in the implementation of educational activities and tasks, as shown in Fig. 6.

2. The second phase: Individual learning: The implementation of individual learning where each student has implemented his individual task through the sharing pattern assigned to his group, and the individual tasks are evident in the two modes of participation (parallel and sequential) after the teacher determines the main task, then the teacher distributes the sub-tasks to the experimental groups that study the content in the pattern of participation (parallel) Serial) as follows:

  - Distribute individual assignments to a group of students who are sharing in parallel through Video Sharing, keeping all students doing the individual tasks at the same time.
  - Distributing individual assignments to a group of students who are sharing sequentially through a Wiki, taking into account that each student has waited for the previous student to finish his assignment within a specified time and a date has been set to hand over the task to the next student.

3. Third level: Participatory learning: The implementation of participatory learning shows in this stage the actual process of sharing between the members of the participatory team, and the process of sharing and competition between the members of the team from the first task to the last task is evident with all its elements in the participatory work team of the students of the first experimental group that carried out the activity through the pattern of synergistic partnership with each other on And through the Web 2.0 tool (Twitter), a specific time has been set to complete each task. While the students in the second experimental group (performing the activity in a parallel pattern through the Web 2.0 tool (Video Sharing)), and in the experimental group three (performing the activity in a sequential pattern through the Web 2.0 tool (Wiki), after all the students had finished performing the

tasks, they participated in the discussion about the tasks. And compile the final participatory work.

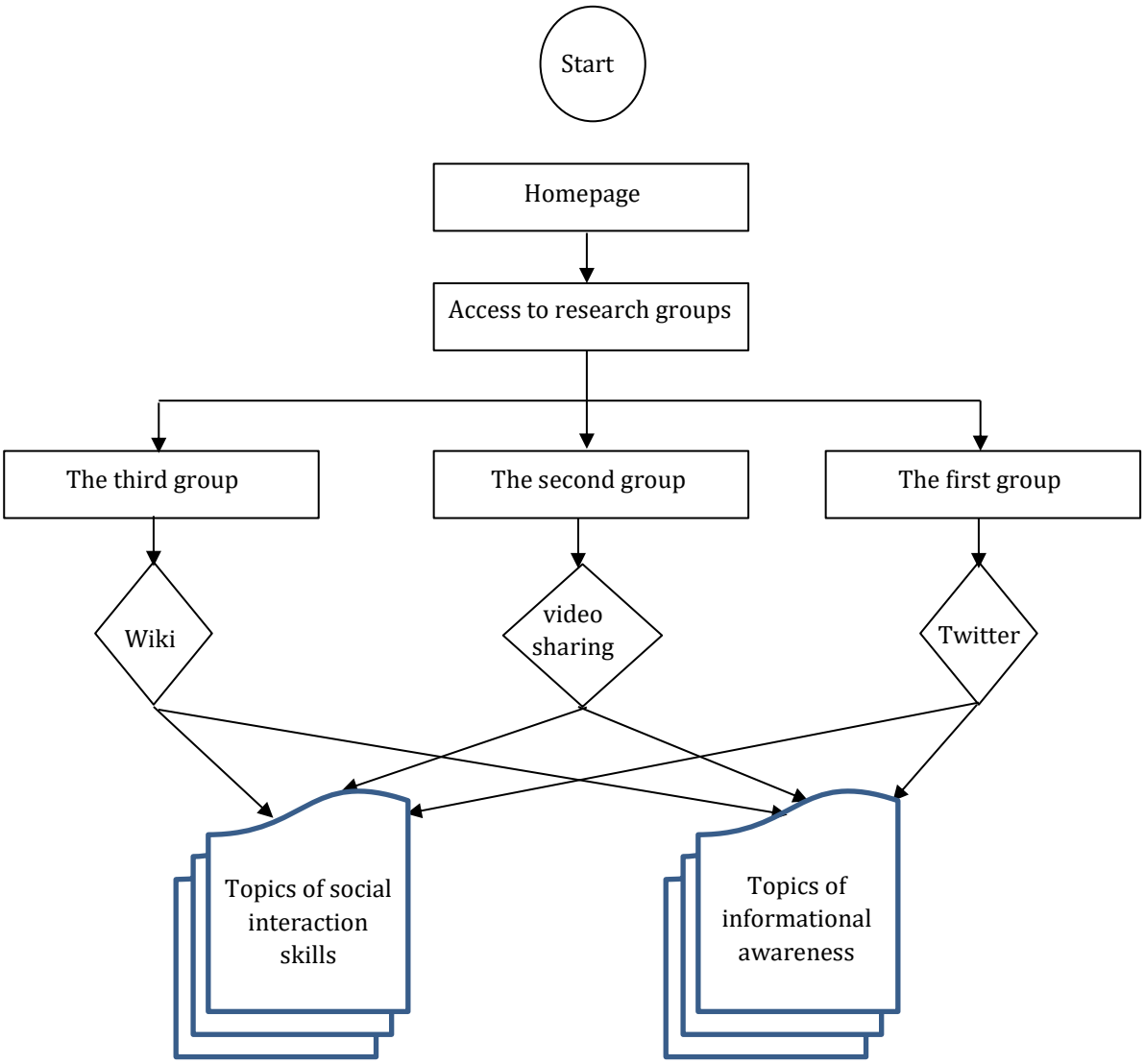


**Fig. 6:** A learning flow map for educational content (information awareness-social interaction skills)

4. The fourth stage: Evaluation

- Assessment of learning outcomes: The students' learning outcomes were evaluated through a cognitive achievement test for the topics of information awareness, a measure of social interaction skills, and a recording of learning outcomes.

5. Set up research tools:

- Cognitive achievement test (prepared by the researchers):

  - Determining the purpose and type of test questions: The achievement test aims to measure the students' level of knowledge about the topics included in the scientific content of informational awareness. Where the type of test questions was determined from (multiple-choice, completion) questions; As it corresponds to the nature of the content teaching, and the scientific and linguistic accuracy was taken into consideration when formulating the test questions, and that the question contains only one answer, in addition to the links between the questions and the educational content presented in the three types of participation (synergistic-parallel-serial) in the participatory e-learning environment.
  - Preparing a table of specifications and relative weights for the test: This is in order to determine the topics covered by the test, in addition to identifying the questions that are related to each of the first levels of Bloom (remembering, understanding, and application). It has been taken into account that the items of the test include all the scientific content that students have studied related to information awareness.
  - Formulation of test instructions: The instructions were drawn up on the first page of the test, and it was taken into account during formulation that they are clear and accurate, and formulated in a manner commensurate with the level of second-level students of the Computer Science Department at Community College-University of Hail.

- The scientific setting of the test:

- Verify the validity of the test: To assess the validity of the test, it was presented in its initial form to a group of arbitrators in order to ascertain the clarity of the questions and instructions, the extent of their relevance to the behavioral objectives of the scientific content of informational awareness, and their suitability for the characteristics of the students in the research sample. The judges agreed on the validity of the test for the purpose for which it was prepared, and accordingly, the researchers modified the initial image of the test in the light of the referees 'proposals, and it became ready for use.
- Test Reliability: Calculation of test reliability factor: The researchers calculated the reliability using the retest method, by calculating the Pearson Correlation coefficient between the two applications, and the results were as Table 2.

**Table 2:** Achievement test reliability factor

| Type of test | The number of students | Correlation coefficient value | Indication level |
|---|---|---|---|
| Achievement | 18 | 0.96 | 0.01 |

It is evident from the results of Table 2 that the value of the test reliability coefficient= (0.96), and this indicates that the test has a high degree of stability.

- Determine the test time: The average time taken to perform the test was calculated, and the test time was approximately 20 minutes.
- Score estimation and correction method: A single score was estimated for which the student answered correctly, and zero for each item that he left or answered incorrectly, provided that the total score of the test is equal to the number of test items. After completing the test preparation procedures, verifying its validity and stability, and controlling it statistically, the test became applicable in its final form.

6. Building a measure of social interaction skills (Prepared by the researchers):

- After the researchers reviewed the theoretical standards and frameworks of some previous studies close to the current research and depending on the theoretical framework of the scale of social interaction skills and taking the opinions of a group of experts and specialists in the field of research, it was reached to identify five areas of the phenomenon to be studied: (communication skills with others, skills Cooperation, Help Skills, Emotional Control Skills, Leadership Skills).
- Determining the objective of the scale: It aims to measure the students' ability to practice social interaction skills.
- Calculation of reliability and validity of scale:

- The reliability of the scale was calculated through Cooper's equation to calculate the stability, where the ratio of the reliability coefficient was 0.67, which is a high value, which makes the scale valid for measuring what a goal to measure it.
- Validate scale: To calculate the validity of the scale, a group of experts in educational technology was presented, and they agreed on its validity for application at a rate higher than 89%, and therefore the scale is considered valid for application.

### 5.12. Basic research experiment

#### 5.12.1. Pre-application of research tools

The researchers applied the research tools to verify the equivalence of the three groups, using the Kruskal-Wallis Test, in order to find out the significance of the difference between the ranks of the group averages in the pre-application of the information awareness achievement test, the Social Interaction Scale, and the Table 3 summarizes these results.

**Table 3:** The results of the Kruskal-Wallis test to study the differences between the ranks of the research groups, namely (Twitter-Video Sharing-Wiki) in the pretest application for informational awareness and social interaction scale

| Measurement tools | Average ranks | | | Test statistician ( x2 ) | Indication level |
|---|---|---|---|---|---|
| | Mug 1 | Mug 2 | Mug 3 | | |
| Achievement test | 9.5 | 9.75 | 9.25 | .028 | .986 |
| Social Interaction Scale | 9.67 | 10.00 | 8.83 | .154 | .926 |

It is evident from the results of the previous Table 3:

- There was no statistically significant difference between the research groups in the pre-application of the achievement test in information awareness, as the statistic value was x2 (0.028), which is a non-statistically significant value, and thus it is possible to predict the parity of groups in the cognitive achievement of information awareness.
- There was no statistically significant difference between the research groups in the pre-application of the Social Interaction Skills Scale, as the statistic value of x2 (0.154) was a non-statistically significant value, and thus the parity of groups can be predicted beforehand in social interaction.

#### 5.12.2. Implementation of the basic research experiment

After ensuring the equivalence of the three experimental groups, the basic research experiment was started, and implementation procedures were carried out during the second semester of the 2019/2020 academic year, according to the following:

- Explanation to the students of the three experimental groups regarding the methods of accessing the site, the scientific content of information awareness, social interaction skills, and methods of movement between the units of educational content.
- Introduce each student to the group to which he belongs and give him his own password and username
- Explain the web-based interaction methods used to students in each group, as well as the engagement tools, and train them in their use.
- The students of the three groups studied information awareness and social interaction skills from 3/3/2019 to 3/24/2019.
- After students study the scientific content, the researchers distributed tasks to each group to perform the participatory activity from 7/4/2019 to 14/4/2019, where:

  - The researchers interviewed the students of the first experimental group, to familiarize them with how to perform activities and tasks in a synergistic style of sharing, to explain how to work through Web 2.0 tools (Twitter), as well as to introduce them to how to interact with each other through communication and interaction tools.
  - The researchers also interviewed the second experimental group to familiarize them with how to perform activities and tasks in the parallel sharing pattern and to explain how to work through Web 2.0 (Video Sharing) tools, as well as how to interact with each other through communication and interaction tools.
  - The researchers also interviewed the third experimental group to familiarize them with how to perform activities and tasks in the pattern of serial sharing and to explain how to work through Web 2.0 tools (Wiki), as well as how to interact with each other through communication and interaction tools.

### 5.12.3. Post implementation of research tools

After completing the implementation of the research experiment and studying the special content (informational awareness-social interaction skills) and carrying out the required activities and duties, the researchers applied the tele-research tools in the period from 4/16/2020 to 20/4/2019, on research groups, monitoring grades, and preparing them for processing. Statistic.

Test the validity of the hypotheses: SPSS statistical analysis was performed through the following tests:

- The Kruskal Wallis Test to study the differences between several independent samples
- Mani and Tiny test, which is an abbreviated test that is used instead of the T-test for two linked samples.

The researchers tested the validity of the research hypotheses, as follows:

- The first assumption: To verify the validity of the first hypothesis, which states "There are statistically significant differences at the level of 0.05 between the mean scores of the students' scores in the three research groups in the participatory learning environment (synergistic-parallel-serial) in the post-application of the cognitive achievement test of informational awareness (Table 4).

**Table 4:** The results of the Kruskal-Wallis Test to study the differences between the ranks of the research groups, namely (Twitter-Video Sharing-Wiki) in the post-application of informational awareness achievement test

| Measurement tools | Average ranks | | | Test statistician (x2) | Indication level |
|---|---|---|---|---|---|
| | Mug 1 | Mug 2 | Mug 3 | | |
| Achievement test | 15.50 | 3.67 | 9.33 | 15.22 | 0.000 |

It is evident from the results of Table 4:

- There are statistically significant differences between the research groups in the post-application of the achievement test in information awareness.
- To determine the direction of the differences between the three groups, the Mann-Whitney test was applied as shown from the following Table 5.

**Table 5:** Significance of differences using Mann and Tiny for multiple comparisons between the three groups in the post-application of the cognitive achievement test for informational awareness

| Achievement | Mean Rank | Sum of Ranks | ' | Z | sig. |
|---|---|---|---|---|---|
| g1- g2 | 9.50<br>3.50 | 57.00<br>21.00 | 21 | -2.966 | 0.003 |
| q1- q3 | 9.5<br>3.5 | 57<br>21 | 21 | -3 | 0.003 |
| q2- q3 | 3.6<br>9.3 | 22<br>56 | 22 | -2.8 | 0.004 |

It is clear from Table 5 that:

- There are statistically significant differences between the two groups (first and second) in the achievement test for informational awareness, in favor of the first group.
- There are statistically significant differences between the two groups (first and third) in the achievement test for information awareness, in favor of the first group
- There are statistically significant differences between the two groups (second and third) in the achievement test for information awareness, in favor of the second group.

- The second assumption: To verify the validity of the first hypothesis, which states "There are statistically significant differences at the level of 0.05 between the mean scores of the three research groups' students in the participatory

learning environment (synergistic-parallel-serial) in the post-application of the social interaction scale (Table 6)."

**Table 6:** The results of the Kruskal-Wallis test to study the differences between the ranks of the research groups, namely (Twitter-Video Sharing-Wiki) in the dimensional application Social Interaction Scale

| Measurement tools | Average ranks | | | Test statistician (x2) | Indication level |
|---|---|---|---|---|---|
| | Mug 1 | Mug 2 | Mug 3 | | |
| Social Interaction Scale | 15.50 | 4.92 | 8.08 | 12.53 | 0.002 |

- There are statistically significant differences between the research groups in the post-application of the social interaction scale.
- To determine the direction of the differences between the three groups, the Mann-Whitney test was applied as shown in Table 7.

It is clear from Table 7 that:

- There are statistically significant differences between the two groups (first and second) in the post-interaction scale, in favor of the first group.
- There are statistically significant differences between the two groups (first and third) in the post-interaction scale, in favor of the first group.
- There were no statistically significant differences between the two groups (second and third) in the post-reaction scale.

## 6. Research results

After testing the hypotheses, the researchers reached the following conclusions:

1. The two modes of participation (synergistic and sequential) were superior to that of (parallel) in the development of cognitive achievement of information awareness.
2. The participatory style (synergistic) was superior to the two modes of participation (parallel and serial) in developing social interaction skills.
3. The effectiveness of the three types of participation (synergistic-sequential-parallel) in developing cognitive achievement of information awareness and social interaction skills in favor of post-performance.

## 7. Discussion of the research results

The results of the statistical treatments confirmed the rejection of the first and second hypotheses of the research hypotheses and the acceptance of alternative hypotheses, as the results confirmed the superiority of the two types of sharing (synergistic, serial) through the two tools of Web 2.0 (Twitter, Wiki), on the pattern of sharing (parallel) through the Web 2.0 tool (Video Sharing), in developing the cognitive achievement of information awareness, as well as the superiority of the (synergistic) mode of sharing through the Web 2.0 tool (Twitter), over the two types of sharing (parallel and serial) through the two web tools (Video Sharing-Wiki) in developing interaction skills Social, as a result of the participatory learning methods and tools used, in addition to what distinguished this style in providing various opportunities for sharing and interaction among students more broadly, as the students of the first experimental group shared synergistically and performed all tasks together, competing and sharing since the beginning of the participatory activity through Twitter, where they did the following:

- Discuss with the teacher about the main task and sub-tasks of the activity through instructions, messaging, and chat rooms
- Discussion and dialogue between students within groups helped them understand concepts more effectively through auxiliary activities (experiments-virtual environments ...).
- The students interacted with the teacher discussed each assignment and received continuous feedback to adjust and correct the work.
- The various participatory tools students used in carrying out the activities provided more opportunities for social interactions.

The students of the first experimental group helped with this by the tools provided by Twitter that help in teamwork, namely:

- The teacher uses him or her to discuss or track student work and receive inquiries.
- Use it as a tool to collect and share resources: Where students are required to share additional resources or information on a previous lesson topic, and they can use summaries, questions, or present a topic for discussion.

These results are also due to the contents and principles of activity theory, where participatory e-learning and its patterns (synergistic-serial-parallel) are closely related to Vygotsky (1978). The important activity theory of "convergent growth limit" ZPD Zone of Proximal Development assumes that the cognitive development of the learner depends closely Essential for interacting, discussing, and socializing with others who are more knowledgeable and able to learn.

## 8. Research recommendations

- Attention to designing and producing digital courses based on participatory learning systems to develop different skills of learners of all educational levels.
- The need to develop skills that require the application of thinking skills, such as creative thinking skills, critical thinking, and social intelligence
- Application of the proposed model for patterns of participation within groups through Web 2.0 tools

(Twitter-Video Sharing-Wiki), in studying some of the most theoretical courses.

**Table 7:** Significance of differences using Mann and Tenny for the multiple comparisons between the three groups in the post-application of the post-reaction scale

| Interaction | N | Mean Rank | Sum of Ranks | W | Z | sig. |
|---|---|---|---|---|---|---|
| g1- g2 | 6 | 9.50 | 57.00 | 21 | -2.91 | 0.003 |
| | 6 | 3.50 | 21.00 | | | |
| q1- q3 | 6 | 9.5 | 57 | 21 | -2.91 | 0.004 |
| | 6 | 3.5 | 21 | | | |
| q2- q3 | 6 | 4.92 | 29.50 | 29.50 | -1.53 | 0.126 |
| | 6 | 8.08 | 48.50 | | | |

## 9. Research suggestions

Interest in studying the effectiveness of web tools not used in the current research in developing information awareness and social interaction skills.

- The effect of using activity theory with another web 2.0 tools like Google Docs, Flickr, etc.
- Study the impact of the interaction between participatory patterns and the size of participatory groups in the learning environment for web design development.

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## Compliance with ethical standards

## Conflict of interest

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## References

Adu-Gyamfi K, Ampiah JG, and Agyei DD (2020). Participatory teaching and learning approach: A framework for teaching redox reactions at high school level. International Journal of Education and Practice, 8(1): 106-120. https://doi.org/10.18488/journal.61.2020.81.106.120

Alsaqri SH, Alkwiese MJ, and Dayrit RD (2018). Impact of social Networking sites on study habits among Saudi Nursing Students in Hail University. International Journal of Advanced and Applied Sciences, 5(4): 100-108. https://doi.org/10.21833/ijaas.2018.04.013

Alshamari SA and Aichouni M (2020). Mobile applications for quality improvement in technical and vocational education: A case study of Saudi Arabia. International Journal of Advanced and Applied Sciences, 7(12): 56-61. https://doi.org/10.21833/ijaas.2020.12.006

Blayone TJ, Barber W, DiGiuseppe M, and Childs E (2017). Democratizing digital learning: Theorizing the fully online learning community model. International Journal of Educational Technology in Higher Education, 14(1): 1-16. https://doi.org/10.1186/s41239-017-0051-4

Bolatli Z and Korucu AT (2018). Secondary school students' feedback on course processing and collaborative learning with web 2.0 tools-supported STEM activities. Bartın Üniversitesi Eğitim Fakültesi Dergisi, 7(2): 456-478. https://doi.org/10.14686/buefad.358488

Gursoy G and Goksun DO (2019). The experiences of pre-service science teachers in educational content development using web 2.0 tools. Contemporary Educational Technology, 10(4): 338-357. https://doi.org/10.30935/cet.634168

Hadwin A, Järvelä S, and Miller M (2018). Self-regulation, co-regulation, and shared regulation in collaborative learning environments. In: Schunk DH and Green JA (Eds.), Handbook of self-rgulationof learning and performance: 83-106. Routledge/Taylor and Francis Group, New York, USA. https://doi.org/10.4324/9781315697048-6

Heinimäki OP, Volet S, and Vauras M (2020). Core and activity-specific functional participatory roles in collaborative science learning. Frontline Learning Research, 8(2): 65-89. https://doi.org/10.14786/flr.v8i2.469

Ismaile S and Alhosban F (2018). Students perceptions of audience response system in classroom feedback: A qualitative study. International Journal of Advanced and Applied Sciences, 5(4): 67-72. https://doi.org/10.21833/ijaas.2018.04.008

Ivlev VY, Barkova EV, Ivleva MI, and Buzskaya OM (2016). Environmental approach to the study of the modern stage of information society development: Research prospects. International Journal of Environmental and Science Education, 11(16): 9113-9124.

Kaplan S (2002). Strategies for collaborative learning building e-learning and blended learning communities. Available online at: http://www.icohere.com/collaborativelear-ning.htm

Karasavvidis I (2008). Activity theory as a theoretical framework for the study of blended learning: A case study. In the 6th International Conference on Networked Learning, Halkidiki, Greece: 195-202.

Krtalic M, Marcetic H, and Micunovic M (2016). Personal digital information archiving among students of social sciences and humanities. Information Research: An International Electronic Journal, 21(2). Available online at: https://eric.ed.gov/?id=EJ1104374

Onbasili ÜI (2020). The effects of science teaching practice supported with web 2.0 tools on prospective elementary school teachers' self-efficacy beliefs. International Journal of Progressive Education, 16(2): 91-110. https://doi.org/10.29329/ijpe.2020.241.7

Saborit JAP, Fernández-Río J, Estrada JAC, Méndez-Giménez A, and Alonso DM (2016). Teachers' attitude and perception towards cooperative learning implementation: Influence of continuing training. Teaching and Teacher Education, 59: 438-445. https://doi.org/10.1016/j.tate.2016.07.020

Shahzad A, Reba A, and Khattak UR (2020). Effects of transition technique on motivation of the students at secondary level. International Journal of Advanced and Applied Sciences, 7(11): 97-101. https://doi.org/10.21833/ijaas.2020.11.010

Vygotsky LS (1978). Socio-cultural theory. Mind in society. Harvard University Press, Cambridge, USA.

Wang SL and Hwang GJ (2012). The role of collective efficacy, cognitive quality, and task cohesion in computer-supported collaborative learning (CSCL). Computers and Education, 58(2): 679-687. https://doi.org/10.1016/j.compedu.2011.09.003

Yueh HP, Huang JY, and Chang C (2015). Exploring factors affecting students' continued Wiki use for individual and collaborative learning: An extended UTAUT perspective. Australasian Journal of Educational Technology, 31(1): 16-31. https://doi.org/10.14742/ajet.170

Zainol A and Almukadi WS (2020). Implementing problem-based learning in the software engineering course. International Journal of Advanced and Applied Sciences, 7(12): 19-26. https://doi.org/10.21833/ijaas.2020.12.002