



Interaction between support patterns (human-smart) and e- collaboration groups size to develop website programming skills of computer teachers

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Abstract

The current study aims at investigate the interaction between the two types of support (human \ intelligent),and the size of E-collaborative group in the development of website programming skills among teachers computer . However , the trainees divided into two main groups according to the type of support (human \ intelligent) . Each main group divided into two peer groups , and two pair groups. Which the peer group consisted of 4 individuals .Then, the current study found superiority trainees who studied using the human support pattern compared to those who used the smart support pattern in the cognitive aspect test as well as in the skills of website programming. While there is no effect based on the difference in the size of the collaboration group (pairs\ peers) in testing the cognitive aspect as well as website programming skills . The study also found that there were no statistically significant differences between the average scores of the cognitive aspect test and the skills observation card among the training groups due to the interaction between the two support styles and the groups size with regard to website programming skills.

Keywords: *Peer programming, Human support, intelligent support , collaboration groups size, web programming skills*

Introduction

The skill of programming is the posture of websites creation ,and one of the most important pillars of its development. Many studies have confirmed the difficulty of completing programming tasks for students, in general ,and for beginners ,in particular, which requires them to use learning strategies that facilitate learning programming skills (Youssoof, Sapiyan and kamaludin, Bryant ,Romoto and Bouly,2007) . Many studies have indicated the importance of e- collaboration strategies in learning programming skills as a study (Faga, 2014; Ayub,et all,2019) and a study(Talha Yıldız,2019; Cacefo,Game,2018; Porter , et all,2013).These

studies have confirmed that the learner's participation with his colleagues in learning programming skills within the framework of a clear educational strategy that determines the role of each learner accurately, which contributes to achieving learning goals more effectively, and among these educational strategies is the peer programming strategy which requires many educational and social interactions between students.

In light of the above, it can be said that the main element in the peer programming strategy is the interaction between learners, which affects the cognitive, social and emotional

processes between them. One of the most important types of interactions that are related to the peer programming strategy is the two types of interaction " Peer programming ",and " pair programming".

Othman and Hussain (2012) define peer programming as: A learning strategy based on sharing between learners who analyze, plan, cod, design and test programming problems with the need to benefit from the experiences and skills of each partner in the learning group.

Many of studies indicated that learning programming skills in a participatory manner through the web is one of the most appropriate ways that lead to the acquisition of the cognitive and skill sides of programming skills (Khan & Farooq,2018,Wang et all.,2017,Enas Gouda,2017),provided that collaboration learning environments through the web are well designed artistically and pedagogically ,so that it has interaction tools that enable the learner to carry out programming tasks in a participatory manner with a degree of quality and effectiveness.

In addition, the study of the size of e-collaboration groups is one of the most important variables of educational design. because the different number of individuals within a learning group may affect the incidence of participation and interaction in the e-collaboration learning environment and in achievement rates .(Koh&Hill,2010).

Undoubtedly ,the results of some studies related to the e-groups size have differed. Which led some of them to indicate the preference for the size of small groups(Mohammed Khalafallah, 2017, Zainab Khalifa and Ahmed Abdel Moneim, 2016) . Others pointed to the preference of the size of medium groups(Amira El-Gamal,2012). Another pointed to the equal effect of the size of the different groups(large, medium, small), (Justic,Danso& Aworwe,2015). While the results of some studies varied in their results on the most appropriate size of working groups(Nevin El-Sayed, Anhaar Rabea, 2017, and Walid Ibrahim, 2013).

Since studies have proven the effectiveness of e-collaborative learning, the current research has tended to increase its effectiveness by studying its design variables. However, the learner may need to provide support or assistance while carrying out the tasks required of him. Hence, the importance of employing electronic support. Educational support also means the assistance processes that are provided to the learner gradually during the learning process inside his learning environment, whether individually or collectively, so that he can solve the problems and complete the performance of his learning tasks that he can't perform alone within the context of learning ,then the assistance gradually disappears after the learner is able to rely on himself in completing learning tasks.(Dennen & Burner, 2008)

The concept of support has evolved to describe the mechanisms of supporting the trainee, whether this support is human or technological ,which helps to complete the training skill required of the trainee as much as he can , (Shapiro,2008).

Human assistance is defined as a form of support provided by the most experienced and knowledgeable human element to the learner in the form of guidance, hints that

help him accomplish the task, and acquire skills that he could not acquire if he learned them only on his own. (Volman&Beishuizen,2012) .

on the other hand ,intelligent support (Gallagher & Daigle, 2002) defines it as a type of electronic support that provides brief and specific information to the learner to help him search for a specific task.

Many studies have examined the impact of the type of support provided to learners.However ,some of them provided support through the human element, such as studying (Badr Madkour, EL-Attar, 2014,Pol, Volman * Beishuzin, 2012) . In addition to this some of them provided support through the intelligent element as a study ,such as (Nohair Mohamed, 2020, Amin Salah et all, 2018, Abeer Morsi, 2014,Casamayor, Amandi &Campo, 2009) In addition, all of them have reached the effectiveness of the support pattern provided in developing the cognitive and performance aspects of the learner..

research problem

1- The experience of the researcher's work as a teacher of computer and as a trainer in professional development programs for computer teachers, the researcher found a clear decline in the programming websites skills among computer teachers, due to a number of reasons, Scarcity of necessary training programs that achieve the level of professional growth of computer teachers in the skills of programming websites.

2-Conferences, including the First International Scientific Conference for qualitative studies in the light of future challenges (2014), international conference on e-Learning in the Arab world on e- collaborative learning in the online community (2014). In addition to the recommendations of some research, which dealt with the peer programming strategy in developing programming language skills such as (Ayub, Karnalim, Senjaya, Wijanto,2019),(Shorbji,2015) Study, as well as the study of both(Marwa Elmolwany 2018 , Mohammed Khalafallah 2017 , Zainab Khalifa, Ahmad Abd-Elmoaim,2016), (Paul's ,2014). All of these studies suggested research on the different sizes of collaboration groups with different stages and age groups, as well as studies on the different patterns of performance support (human-intelligent) as a study (Nohair Mohammed, 2020 ,Amin Salah, 2018,Abeer Morsey, 2014)..

3- Conducting an exploratory search experiment on a sample of computer teachers and interviewing them, showing their weaknesses in website programming skills.

Research Questions

The problem with research has been low website programming skills in PHP language ,and the current research tries to answer the following key question:

what is the impact of interaction between support modes (human-intelligent) and the size of e-collaboration groups to develop the programming skills of computer teachers?

And It has the following sub-questions:

1- What are the website programming skills in PHP language that are intended to be developed by computer teachers?

2 What is the educational design suitable for a collaborative learning environment based on different support patterns (human-smart) and the different size of collaboration

groups to develop computer teachers' website programming skills?

3- What is the effectiveness of support (human-intelligent) in developing the skills of computer teachers' website programming?

4- What is the effectiveness of the different size of e-collaborative groups in developing the programming skills of computer teachers?

5- What is the impact of interactions between support patterns (human-intelligent) and the size of e-collaborative groups in the development of website programming skills of computer teachers?

Aims of the research:

1- Preparation of a list of website programming skills in the PHP language.

2- Design of peer programming environment based on different support patterns and different groups size in the development of website programming skills of computer teachers.

3- Measuring the effectiveness of support modules (human-intelligent) in developing website programming skills of computer teachers.

4- Measuring the effectiveness of different groups size in website programming skills of computer teachers.

5- Measuring the impact of the interaction between the two support patterns and the groups size in the development of website programming skills of computer teachers.

Research importance:

1 - Develop website programming skills through a collaborative learning environment based on peer programming strategy.

2- To help teachers build their own knowledge and skills instead of receiving information negatively.

3- Take advantage of the collaborative learning environment and its various possibilities, and sources of support in training computer teachers to develop their skills in other programming languages they may need to be trained in it.

Methodology:

experimental method to measure the impact of interactions between the two support patterns and the groups size in the development of website programming skills of computer teachers.

Table (1) Experimental design for research:

The group	pre Application	Experimental Processing	post Application
Four experimental sets of computer teachers	Cognitive aspect testing - programming skills Note Card	peer programming strategy based on interaction between the two support patterns and the size of the e-collaboration group	Cognitive aspect testing - programming skills Note Card

Research Hypotheses

Regarding to the cognitive side:

-1- There are no statistically significant differences at the level (0.01) between the score averages of experimental groups based on different support patterns (human-intelligent) in the cognitive aspect test associated with website programming skills.

2- There are no statistically significant differences at the level (0.01) between the score averages of experimental groups based on different groups size (pairs-peers) in the cognitive aspect test associated with website programming skills.

3- There are no statistically significant differences at the level (0.01) between the averages of experimental group scores in the cognitive side test associated with website programming skills due to the interaction between the two support patterns and groups size .

Regarding to the skills side:

1 - There are no differences of statistical significance at the level of (0.01) between the score averages of experimental groups based on different support patterns (human-intelligent) in the application for programming skills note card.

2 - There are no differences of statistical significance at the level of (0.01) between the score averages of experimental groups based on different groups size (pairs-peers) in the application for programming skills note card.

3 - There are no differences of statistical significance at the level (0.01) between the score averages of experimental group in the application for programming skills note card due to the interaction between the two support patterns and group size .

Limits of Search :

1- Human limit : random sample of 24 computer teachers.

2- Time limits: the search was applied in a period of 8 / 4 / 2023 until 30 / 4 / 2023.

3- Objective limits: Training content for developing website programming skills in PHP language.

Search's terms:

Peer programming (Bravo, Doque and Gallardo ,2013) defines it as a learning strategy to support students' participation in the delivery of learning activities formulated in the form of software problems that require students to analyze this problem, develop alternatives to solve it, choose the best solutions and then express them in the form of code and test these codes in the light of the resulting design.

Human support: (Amin, 2018) defines it as the set of assistance offered to students through human communication and interaction between teachers and students to achieve the level of learning in the development of many skills for students.

Intelligent support: It is defined by (Gallagher & Daigle,2002) as a pattern of e-support that provides concise and standardized information to the learner to help them with the petition to accomplish a particular task.

Website programming: (Young & Wright,2019) is defined as a branch of science that is interested in designing the structure of websites and forming their different elements

using appropriate programming languages that make it ready for viewing on the Internet.

Theoretical Frame

Electronic Support: (Chen and Ching,2014) defined it as gates used to build and strengthen what the learner currently knows to reach out to what he knows, and as a communication process between the teacher and the learner by presenting the elements he needs and their details and then training them

Classification of e-educational support patterns: Several studies referred to several e-educational support classifications(Mohammed Khamis ,2003; Aleesi, Trollip ,2001).

Procedural Help: Providing assistance to the learner during the course of the program, such as how to run the program, control, know the different icons and the function of each icon that exists, must always be available to the learner as they are presented in the form of preliminary information at the beginning of the program.

Information Help Provides this type of content support and assistance for summary, medium or detailed information, or explanation of vague and unclear words in content , as (Quintana, Reiser & Karjick, 2005) classified support according to its mode of delivery to: human and technological support

Human support: It aims to support the learner in the implementation of the required skills by providing instructions, practical examples and performance models for the skills to be performed, provided that support is provided by an experienced teacher, or peer by delivering assistance to the trainee first as soon as needed and throughout the implementation of the skill. (Azvedo , Moos , Greene ,& Crumley ,2008).

Intelligent Technology Support: Rodriguze (2006) defined smart help as the type of adaptive support that a user needs at a given time, in specific situations within a particular context

The results of a series of studies also demonstrated the importance of support in its (technological and human) patterns: (Quintana et al , 2005), aimed at the impact of e-support on the development of practical skills and academic achievement for secondary students, through two groups, and the results resulted in no differences between the two patterns (electronic-human).

The (Reas ,et all,2012) study aimed to recognize the impact of web-based learning support on problem-solving skills, and relied on three sources: (teacher Support - technology support - teacher-based support and e-environment) The study confirmed that multiple support further enhances online learning.

Peer programming and different size of collaboration groups:

The Peer programming strategy has several characteristics addressed in several studies, with(Mentz, Vander and Goosen ,2008) identifying five key characteristics of the peer programming strategy: Positive interdependence, individual responsibility, interaction between partners in the programming mission, building social skills, and improving the achievement of assignments.

Interaction patterns in the peer programming strategy:

Peer Programming, Alessio, Sarah, Naomi and William (2009) identified it as a pattern of programming learning that relies on helping students structure and plan activities to accomplish the required programming tasks, as well as helping them learn to engage actively and effectively with their peers through their interaction in the implementation of learning activities.

Pairs Programming: Salleh, Mendes, Grundy (2011) considers that the pair programming is the presence of two characters, one of whom is called the leader and is the person who writes codes and designs the program. The other, called the Observatory, constantly observes the leaders' workers, identifies errors, examines sources and proposes alternative solutions. Then the leader who makes the adjustment tells her and they continue to communicate until the programming tasks are completed.

website programming

(McWhorter,2008) Website programming is defined as a constructive mental activity that entails communication to an electronic product, sites differ from each other in terms of their components and modus operandi, and relies on HTML coding language in addition to many other languages such as PHP - Asp – Java.

Search Procedures:

First: Build a list of procedural objectives

The researcher did the following:

- 1- Select 10 learning topics in website programming content in programming language PHP
- 2- Deriving general objectives for educational subjects.
- 3 - Deriving the procedural objectives of educational subjects.

Second: Building a list of standards for designing a collaborative learning environment

- 1- The overall objective of the list of standards had been defined.
- 2- The preliminary list was prepared where it contained 10 criteria with indicators associated with each standard.

Third: Designing The Collaborative Learning Environment according to Abdullatif Al-Jazzar Instructional Design Model (2013):

Analysing Stage:

Identifying Learners' Characteristics, Prior Learning, and Demanding Learning:

Teachers are computer teachers for the secondary , Twenty four computer teachers don't have PHP Programming Website Skills.

Designing Stage:

- 1) **Formulating the Educational Objectives According to the ABCD Application:**The general goals are formulated for each educational module. The researcher has also formulated the behavior goals in specific terms.
- 2) **Identifying the Educational Content Elements and Grouping them into Lessons**
- 3) **Designing Evaluation and Tests:** Cognitive side tests have been prepared, as the PHP Programming Website Skills Note Card has also been prepared.
- 4) **Designing Educational Experiences:** Trainees have used abstract and surreal experiences, as they have interacted with the electronic content, and

- produced and shared files and documents that are based on programming.
- 5) **Designing The Collaborative Environment Scenario:** The scenario has been written for the E-Collaborative learning website to develop programming website skills.
 - 6) **Designing Navigation Styles and Interface Interaction:** The main manifests are designed to move and navigate between parts of the environment, and sub-manifests for moving between the topics and their content.
 - 7) **Designing Synchronous and Asynchronous Communication Tools:** The synchronous and asynchronous communication tools were designed, which provided communication between the teacher and the trainee as well as between the trainees and themselves.
 - 8) **Designing a Learner's Registration Method:** The registration system has been designed and the learners have been divided into two main groups according to the support pattern, as the group is registered through the username and password, with the registration of each trainee into his group so that it's not possible to register into the other group.

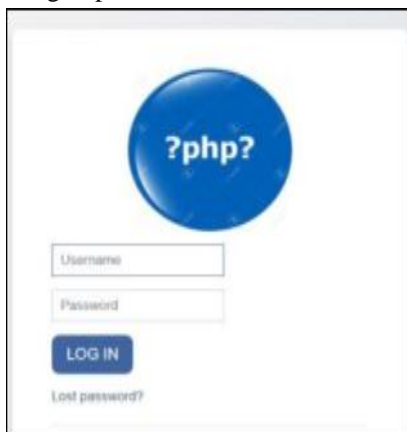


Figure (1): A Login Registration System in an E-Collaborative Learning Environment through Moodle System.

Production Stage: Multimedia was used to produce the educational modules. Some design programs were also used and some ready-made images were processed to be usable. Then, the electronic content was uploaded to the Moodle system to be available via the link:

<https://learning.code-iss.com/login/index.php>

Structural Evaluation Stage:

The structural evaluation for the E-Collaborative learning environment has been applied, and that's for ensuring the validity of the environment

Using Stage:

The application was approved along with the research sample .

Research Tools:

Education Site Level Card: The aim of the card was determined as it was prepared in its initial form, and the evaluation system was determined. Its validity was verified,

then the amendments were implemented, and then it was prepared in its final form.

Cognitive Side Test: The test aims to measure the cognitive side of PHP Programming Website Skills. Evaluation of the Test Scores & Method of Corrections: One point was set for each question so that the total test score was 93 degrees.

Programming Skills Observation Card: This card aims to know the extent to which computer teachers have the skills of programming websites in PHP. The card included a set of 18 basic skills, then each basic skill was analyzed into several 93 sub-skills.

The Final Application of The Collaborative Education Environment:

The Research Sample:

The research was applied to a sample of 24 computer teachers and they were divided into two main groups according to the support style (the first group learns using the human support style / the second group learns using the smart support style), then each main group was divided into four subgroups according to the size of the group (two peer groups of 8 trainees), (two groups of pairs of 4 trainees) for one main group; Thus, the number of trainees for each main group is 12 trainees, so that in the end, the number of trainees will be 24 for all groups.

Application Procedures:

Pre-Application of The Research Tools:

The researcher applied the test of the cognitive side and the observation card on the research sample before starting the implementation of the experiment.

Application of The Research Experiment on The Research Sample:

The researcher applied the research experiment, which lasted 28 days, to computer teachers, The research tools were applied remotely to the members of the experimental groups after completing the training program.

Results

First hypothesis test:

To test this hypothesis, the researcher used the T-Test to determine the significance of the differences between the mean scores of the trainees in the post-application. To test the cognitive side, it is due to the main effect of the different support patterns (human – intelligent), and the results shown in Table (4) have been reached

Table (3): The significance of the differences between the mean scores in the post-application of the cognitive side test is due to the difference in the support pattern (human - intelligent).

Group	N	mean	Standard Deviation	Freedom degree	T- Value	Significance	Significance Level
Human Support	12	89.50	2.39	22	7.2860	0.01	Significant
Intelligent Support	12	72.00	8.00				

It is clear from the previous table that the level of significance is equal to (0.01), and this indicates that there are statistically significant differences between the mean scores of the trainees in the post-application of the cognitive aspect test related to programming websites skills due to the

main effect of the difference in the support pattern (human – intelligent) at the level of significance (0.01), as the average score of the group that used the human support pattern was equal to (89.50) and the average score of the group that used the smart support pattern was equal to (72.00), this indicates the superiority of the group that used the (human) support pattern in the aspect of cognitive test.

And from the previous results, the first hypothesis is rejected and the alternative hypothesis is accepted, which states that **“There are statistically significant differences at the level (0.01) between the mean scores of the experimental groups based on the difference of the two types of support (human – intelligent) in the test of the dimensional cognitive aspect associated with programming skills websites for the benefit of the group taught using the human support pattern”.**

Second hypothesis test

To test this hypothesis, the researcher used the T-Test to determine the significance of the differences between the average scores of the trainees in the post-test. The cognitive aspect related to the skills of programming websites is due to the main effect of the difference in the groups size (peers – pairs). The results shown in Table (4) have been reached.

Table (4): The significance of the differences between the cycling averages in the post-application of the cognitive side test due to the difference in the groups size (peers – pairs)

Group	N	mean	Standard Deviation	Freedom degree	T-Value	Sig	Sig Level
Peers	16	81.06	9.88	22	0.199	0.844	Insignificant
Pairs	8	80.13	12.74				

It is clear from the previous table that the level of significance is equal to (0.844), and this indicates that there are no statistically significant differences between the average scores of the trainees in the application after the test. The average score of the group that studied according to the size of the peered group is equal to (81.06) The average score of the group that studied according to the size of the paired group is equal to (80.13), this indicates that the group that studied according to the size of the peered group is not superior to the group that studied according to the size of the paired group.

And from the previous results, the hypothesis is accepted, which states that **“There are no statistically significant differences at the level (0.01) between the mean scores of the experimental groups based on the difference in group size (pairs – peers) in the test of the dimensional cognitive aspect associated with programming website skills.”**

Third hypothesis test:

To test this hypothesis, the researcher used the two-way analysis of variance method to calculate the arithmetic mean and standard deviation of the scores, and then calculate the “F” value to test the significance of the differences between the average scores of the cognitive side test related to programming website skills.

Table (5): The arithmetic means, standard deviation, and “F” value of the trainees’ scores in the post-application of the cognitive aspect test are due to the interaction between (the pattern of support and the groups size).

Source of Variance	Sum of Squares	Degrees of Freedom	Mean of Squares	“F” Value	Sig Level
Support Pattern	1837.688	1	1837.688	51.903	0.000
Groups Size	4.688	1	4.688	132.	0.720
Support Pattern * Groups Size	54.187	1	54.187	1.530	0.230
The Error	708.125	20	35.406		
Total	159098.000	24			

The table shows the value of "F" equal to (1.530) and the value of statistical significance (0.230), which is not statistically significant at the level of significance (0.01). Thus, the third hypothesis is accepted, which states that **“There are no statistically significant differences at The level (0.01) between the mean scores of the four groups in the test of the dimensional cognitive aspect related to the skills of programming websites is due to the interaction, while the support (human - intelligent) and the groups size (peers - pairs)”.**

Forth hypothesis test:

To test this hypothesis, the researcher used the T-test to determine the significance of the differences between the average scores of the trainees in the post-application of the observation card. The skills for programming websites are due to the difference in the type of support (human - intelligent). The results shown in Table (6) have been reached.

Table (6): Significance of the differences between the mean scores of the trainees in the post application of the obligation card skills for programming websites due to the difference in the type of support (human – intelligent)

Group	N	Average	Standard Deviation	Degrees of Freedom	T-Value	Sig	Sig Level
Human Support	12	85.75	3.47	22	2.866	0.01	Sig
Intelligent Support	12	78.58	7.94				

It is clear from the previous table that the level of significance is equal to (0.01), and this indicates that there are statistically significant differences between the average scores of the trainees in the application of the observation card of skills of programming websites due to the difference in the support pattern (human – intelligent) at the level of significance (0 .01) As the average score of the group that used the human support pattern was equal to (85.75) and the average score of the group that used the intelligent support pattern was equal to (78.58), this indicates the superiority of

the group that used the human support pattern in the observation card of skills for programming websites. From the previous results, the fourth hypothesis is rejected and the alternative hypothesis is accepted, which states that **“There are statistically significant differences at the level (0.01) between the mean scores of the experimental groups based on the difference of the two types of support (human – intelligent) in the post-application of the observation card skills for Programming for the benefit of the group taught using the human support pattern.**

Fifth hypothesis test:

To test this hypothesis, the researcher used the T-Test to determine the significance of the differences between the average scores of the trainees in the post-application of the observation card of the skills for programming websites due to the difference in the groups size (pairs - peers), and the results shown in Table (7) have been reached.

Table (7): The significance of the differences between the mean scores of the trainees in the post application of the observation card of the skills for programming websites is due to a difference according to the groups size

Group	N	Average	SD	Degrees of Freedom	T-	Sig	Sig Level
Peers	6	80.938	7.541	22	0.2333	1.226	Insignificant
Pairs	8	84.625	5.449				

It is clear from the previous table that the level of significance is equal to (1.226), and this indicates that there are no statistically significant differences between the average scores of the trainees in the post-application of the observation card for programming websites due to the difference in the groups size (pairs - peers) at the level of significance (0.01) where the average score of the group that was trained according to the size of the peer group is equal to (80.938), the average score of the group that was trained according to the size of the pair group is equal to (84.625), this indicates that one of the two groups is not superior to the other.

And from the results of the previous one, the fifth hypothesis is accepted, which states that **“There are no statistically significant differences at the level (0.01) between the mean scores of the experimental groups based on the difference in the groups size in the post application of the observation card of programming skills”.**

Sixth hypothesis test:

To test this hypothesis, the researcher used the two-way analysis of variance method to calculate the arithmetic mean and standard deviation of the scores, then calculate the “F” value in order to test the significance of the differences between the mean differences of the scores of the observation card of programming website skills.

Table (8): The arithmetic means, standard deviation, and "F" value of the trainees' scores in the post application of the observation card of programming website skills are due to the interaction between (the pattern of support and groups size).

Source of Variance	Sum of Squares	Degrees of Freedom	Mean of Squares	"F" Value	Sig Level
Support Pattern	188.021	1	188.021	5.529	0.03
Groups Size	72.521	1	72.521	2.133	0.160
Support Pattern * Groups Size	72.521	1	72.521	2.133	0.160
The Error	680.125	20	34.006		
Total	163166.000	24			

The table shows the value of "F" equal to (2.133) and the value of statistical significance (0.160), which is not statistically significant at the level of significance (0.01). Thus, the sixth hypothesis was accepted, which states that **“There are no statistically significant differences at the level of (0.01) between the mean scores of the four groups in the observation card of programming website skills due to the interaction between the two types of support (human - intelligent) and the groups size**

Discussion

The study proved the superiority of human support over intelligent support in developing the knowledge and skills side; This is because human support exists in many interaction tools such as chat rooms, a Collaborative forum, and a Collaborative code editor, and that intelligent support may sometimes cause a loss of time to search for the required assistance other than human support, and this is consistent with a study of (Raiser 2004, Stahr 2008) where they proved that the best form of support is what humans provide, as a trainer closely monitors the trainees during training via electronic media to provide them with human support.

The study also proved that there were no significant differences between the two groups that were trained according to the groups size (peers – pairs) in the cognitive and skills test; this is due to the fact that the design of the Collaborative learning environment and the communication tools led to the success of the interaction between all the trainees of different patterns and sizes of their interaction. These tools are represented in e-mail - interactive chat - electronic forum - peer programming code editor. This is confirmed by many studies such as (Wilson 2004, Hanks 2008, Boyer et al 2008), where they proved that the use of peer programming groups for communication tools helps in detecting errors in writing code and increases the quality of the written code and the quality of the resulting design.

The study also showed that there was no interaction between each of the type of support provided and the groups size in the cognitive aspect test and in the skills test; this is due to achieving equality in the level of support provided, helps, feedback to all trainees throughout the training period.

Recommendation:

Develop computer teacher training programs by providing Collaborative training platforms.

Interest in developing students' skills in PHP Programming Websites depending on the list of skills reached.

Using support patterns associated with artificial intelligence applications when designing E-Collaborative learning.

Suggestions:

Conduct a study based on the different types of support with the different groups sizes in developing the skills of other programming languages.

Conducting a study based on the use of the smart agent as a form of electronic support in developing programming skills.

Researching the use of an artificial intelligence-based environment to develop website programming skills.

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