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## Effect of Difference of Two Blended Learning Styles across the Web (Individual /Collective) on Developing Programming Skills for Secondary School Students

**Abdelraouf Mohamed Ismail**

Associate Professor, Department of Educational Media and Technology, Arab East  
College for Graduate Studies, Saudi Arabia  
amismail@arabeast.edu.sa

**Basmah Abdulkareem Alshammari**

Master of Arts in Educational Media and Technology, Arab East College for  
Graduate Studies, Saudi Arabia

### Abstract

The study aimed to learn the effect of the differently integrated web learning (individual/group) learning on the development of web page design skills for high school students, and the current study used the method of experimental, and the study sample consisted of (20) students from the first secondary school students, I also used the two -settling experimental design; Where the study of the first experimental group according to the web learning in the individual style and the second group was studied according to the web learning in the collective style; And to the existence of statistically significant differences at the level of significance  $0.05) \geq \alpha$ ) between the averages of the two experimental groups in the post -application in the skill test in favor of the experimental group that uses integrated learning across the web in its individual style, which confirms that the individual integrated learning outperformed the collective learning in the development of The cognitive and skill aspect assigned to the design of web pages. The study recommended attention in providing technical equipment in schools to turn from its traditional form to electronic, training teachers

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in schools to develop their skills in the use of modern digital applications and urge them to do them in the educational process, and to employ integrated learning in the classroom.

**Keywords:** Blended Learning, Blended Learning Styles across the Web (Individual /Collective), Programming Skills.

## 1. Introduction

Studies and research on e-learning have gained significant attention as they explore modern technical methods and approaches employed in the educational process. Like other sectors, education has been influenced by advancements in information and communication technology. One of its major achievements is transforming traditional education into e-learning by utilizing communication technologies, tools, applications, and educational platforms to deliver educational content to learners.

"E-learning systems are positive educational frameworks that encourage continuous interaction through various multimedia components. With the emergence of new technologies, the teacher is no longer the sole source of knowledge; instead, multiple diverse sources are now available, enabling learners to develop skills and scientific experiences that align with future societal needs" (Subhi, 2020, p. 142). The researchers observed that several electronic innovations and web-based educational strategies have contributed to enhancing motivation toward learning, including blended learning, which has become a focal point for educational institutions across different stages and levels.

In this context, Al-Hawamleh (2021, p. 41) indicated that "blended e-learning focuses on delivering learning in an interactive, flexible, and diverse manner, helping to create suitable learning environments for learners." The study by Al-Shahwan (2014) recommended the necessity of applying blended learning in teaching various curricula to improve learning outcomes and called for further research on its

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effectiveness in developing learning skills related to educational content. Moreover, Hess et al. (2016) confirmed that blended learning enhances the educational environment, making it more effective. Many learners show greater effectiveness when e-learning is combined with traditional education, as the communication between them and the teacher becomes more efficient.

In terms of the two modes of web-based blended learning, Al-Qarni (2021, p. 423) highlighted the individual learning mode, where the learner independently engages in educational activities and tasks according to their ability and learning speed, taking responsibility for achieving the specified educational objectives. The learner is self-assessed based on their personal capacity rather than compared to their peers. Sheikh (2014, p. 220) described "collaborative e-learning as a mode that involves an educational environment with a system of processes that define and organize group learning activities and interactions, facilitating collaboration and social interaction among groups of learners, teachers, and learning resources via the web to accomplish a task or achieve shared educational goals." The researchers focused on these two modes in conducting experimental treatment using a blended teaching and learning strategy to develop web page design skills.

Ismail et al. (2018, p. 238) referred to web page programming as the use of open-source programming languages to produce web pages containing text, tables, images, audio, videos, and hyperlinks. The current study focuses on designing static web pages using HTML, where students only read information, such as books, references, and articles, without any interactive content. Al-Zahrani's study (2019) recommended using blended learning, as explored in the current research, for teaching web page design skills to seventh-level students in the College of Education at Al-Baha University due to its positive impact on developing their cognitive and practical skills.

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Ramoud (2013, p. 73) mentioned several factors that made the web a crucial medium for disseminating knowledge and learning, emphasizing the importance of equipping students/teachers with web page design skills. This involves establishing procedures and plans to guide the learner's navigation within the pages, defining the conditions for transitioning from one page to another, enabling the learner to move through the content in a manner that suits their characteristics and abilities.

Considering the direction toward safely reopening schools, the Saudi Ministry of Education has adopted blended learning, which combines traditional educational environments with e-learning strategies, tools, and applications. This approach has significantly enhanced student performance, as demonstrated by previous studies, including those by Al-Qahtani (2018), Abdul-Aziz (2019), and Al-Eisa (2018). Abu Atiyah's (2021) study also confirmed the positive impact of blended learning on students, as it captured their attention through multiple sources and multimedia components, including colors and electronic images, helping learners organize their information and ideas more effectively. Therefore, the importance of using web-based blended learning in both individual and collaborative modes to develop learning skills related to the current study's problem became clear.

### **1.1 Problem Identification and Research Questions**

Based on the above, the current study's problem is framed by the following main question: What is the impact of the different modes of blended learning (individual vs. collaborative) in a web-based e-learning environment on the development of web page design skills among secondary school students? This main question is further subdivided into the following research questions:

#### **Research Questions**

1. What are the web design programming skills necessary for secondary school students?

2. What are the design criteria for an e-learning environment based on blended learning to develop web design skills among secondary school female students?
3. What is the instructional design for an e-learning environment based on blended learning to develop web design skills among secondary school female students?
4. What is the impact of the different modes of web-based blended learning (individual vs. collaborative) on developing the cognitive aspects related to web design skills among secondary school female students?
5. What is the impact of the different modes of web-based blended learning (individual vs. collaborative) on developing the practical skills related to web design among secondary school female students?

## 1.2 Research Hypotheses

1. There is no statistically significant difference at the significance level ( $\alpha \leq 0.05$ ) between the mean scores of the first experimental group and the second experimental group in the post-test for the cognitive skills related to web design, attributed to the main effect of the different modes of web-based blended learning (individual vs. collaborative).
2. There is no statistically significant difference at the significance level ( $\alpha \leq 0.05$ ) between the mean scores of the first experimental group and the second experimental group in the post-test for the practical skills related to web design, attributed to the main effect of the different modes of web-based blended learning (individual vs. collaborative).

## 1.3 Research Objectives

1. To identify a list of programming skills for web design using HTML for secondary school female students.

2. To develop a list of design criteria for an e-learning environment based on blended learning to enhance web design skills among secondary school female students.
3. To design an e-learning environment based on blended learning to develop web design skills among secondary school female students.
4. To investigate the impact of the different modes of web-based blended learning (individual vs. collaborative) on developing the cognitive aspects related to web design skills among secondary school female students.
5. To investigate the impact of the different modes of web-based blended learning (individual vs. collaborative) on developing the practical skills related to web design among secondary school female students.

## 1.4 Significance of the Study

### Theoretical (Scientific) Importance:

- Informing instructional designers about the most appropriate learning modes supported by blended learning tools that are suitable for developing the cognitive skills related to web design.
- Providing those responsible for designing web-based blended learning environments with foundational principles and criteria that can aid in the creation of these environments, especially in designing individual/collaborative e-learning modes supported by personal Web 2.0 tools.
- This study is expected to contribute to the adoption and practical application of blended learning in developing web design skills, as it represents one of the developmental research studies in the field of educational technology based on blended learning strategies and applications.

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### Practical (Applied) Importance:

- The study's results may benefit the application of e-learning in secondary schools, aligning with Saudi Arabia's Vision 2030, which calls for integrating technology into education.
- This study could pave the way for educational researchers to conduct further studies related to programming skills within the context of designing static, dynamic, and interactive websites.
- The results of this study will assist curriculum planners and developers in creating digital curricula that align with teachers' use of e-learning, incorporating various strategies supported by web-based learning environments in both individual and collaborative learning modes.

### 1.5 Study Terminology

- **Blended Learning Across the Web** Defined by Dangwal (2017) as: "Learning that involves the frameworks of the educational process, including face-to-face teaching and instruction supported by information and communication technology (ICT). It includes direct instruction, indirect instruction, collaborative learning, and individual computer-assisted learning." Operationally, the researchers define it as: A strategy that combines various methods in delivering collaborative, blended, and individual learning through web-based courses, electronic performance support systems, and knowledge management practices, along with face-to-face classroom instruction. It appropriately blends classroom learning with web-based teaching and learning tools, alongside e-learning resources and activities, to meet the educational context's requirements, aiming to enhance the achievement of learning objectives.

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- **Individual Learning** Defined by Al-Majali and Al-Mawajda (2012) as: "A learning method based on the learner's self-directed activity, centered around the learner. The learner carries out all the required learning activities independently, enhancing their skills, taking responsibility for their learning, using printed and non-printed learning resources, controlling their own learning, interacting with the elements of the learning environment, and receiving appropriate support when needed." Operationally, the researchers define it as: A learning mode based on the learner's independent, self-directed work on a specific task without the assistance of others. The learner is responsible for completing the task using a web-based e-learning environment, focusing on knowledge creation and production rather than reception, through the learner's activity and performance, guided by the teacher's directions.
  - **Collaborative Learning** Defined as group learning for research purposes, and as defined by Al-Majali and Al-Mawajda (2012): "A learning method based on interactive activities in small groups consisting of 3 to 5 individuals to achieve shared goals that include cognitive aspects, skills, and attitudes. Students work together, relying on printed and non-printed learning resources, with appropriate support from the teacher when needed." Operationally, the researchers define it as: A learning mode based on interaction among students in small groups (a minimum of three students per group) who share educational goals and tasks through organized and planned group activities using a web-based e-learning environment and its services. It focuses on generating and producing knowledge rather than simply receiving it, through learners' activities and performances, guided by the teacher's instructions.
  - **Web Page Design Skills** Defined by Khamis (2015) as: "Documents placed on a local server or hosted by an internet service provider. The first page of the site



is known as the homepage or start page, and the site is viewed through a web browser." Operationally, the researchers define it as: A set of programming codes using Hypertext Markup Language (HTML) to design web pages, structured as pages written in hypertext language with the homepage as the main interface. Navigation between pages is done via standard or interactive hyperlinks, presented through communication media as standalone (text, image, audio, video) or multimedia formats to deliver specific content related to any field of knowledge.

## 1.6 Study Boundaries

- **Subject Boundaries:** The study focuses on developing web page design skills among secondary school female students using two modes of blended learning across the web (individual and collaborative). The study is limited to several skills related to web design for the study sample using HTML (Hypertext Markup Language), including: (1) Setting up and creating a web page, (2) Adding and formatting text, (3) Adding and modifying tables, (4) Adding image files, (5) Adding video files, (6) Adding animated text, (7) Adding hyperlinks, and (8) Publishing the web page.
- **Geographical Boundaries:** The study was limited to Sundus bint Khalid Secondary School in East Riyadh, under the Riyadh Education Directorate.
- **Human Boundaries:** The study was conducted with 20 first-year secondary school female students.
- **Time Boundaries:** The study was conducted during the second semester of the academic year 1443 AH / 2022 AD.

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## 2. The Concept of Blended Learning

According to Haider (2020), it is impossible to find a single definition for blended learning, as there are various ways to integrate face-to-face classroom time with online lessons. Blended learning can involve reducing physical attendance in favor of video conferences, creating smaller groups to allow for appropriate social distancing, or returning to traditional classroom lessons with technology supporting the learning process more than ever before.

There have been numerous definitions of blended learning in many studies and research. One such definition is by Al-Saleh et al. (2018), who describe it as "an integrated instructional method that combines diverse classroom teaching strategies with both synchronous and asynchronous e-learning strategies, utilizing traditional classrooms, labs, field trips, web pages, the teacher's educational website, email, social media networks, and mobile applications."

Blended learning integrates the use of educational technology and various teaching and learning methods, based on appropriate learning theories for the educational context, to enhance the effectiveness of teaching and learning (Abu Atiya et al., 2019). Trapp (2020) describes blended learning as a mix of multiple approaches to teaching methods, such as self-learning, collaborative learning, teacher-supported learning, or traditional classroom teaching.

Rashid (2017) defines it as "a teaching method that involves integrating traditional and technological environments in various forms." Norbert et al. (2016) suggest that blended learning means a combination of different technologies that rely on the internet and various teaching approaches. Shahin (2020) identifies four different meanings of blended or hybrid learning:

1. Combining different forms of internet-based technology to achieve an educational goal.

2. Combining various teaching methods based on multiple theories, such as constructivism, behaviorism, and cognitivism.
3. Blending any form of technology with face-to-face teaching.
4. Combining technology with real-world tasks to create authentic learning experiences that harmonize learning and work.

Based on the above, the researchers define blended learning as a strategy that combines various methods of delivering collaborative, blended, and individual learning through web-based courses, electronic performance support systems, and knowledge management practices, alongside face-to-face classroom learning. It effectively integrates classroom-based learning with online learning tools and resources to meet the needs of the educational context and improve the achievement of educational goals.

## 2.1 Characteristics of Blended Learning

Blended learning has several key characteristics, as summarized by the Cape Organization (2018):

- 1. Flexibility:** Blended learning provides flexibility in content delivery. Complex topics can be covered in the classroom, while other topics can be accessed online. With an online component, flexibility and convenience increase, allowing learners to engage in training according to their schedules.
- 2. Effectiveness:** Blended learning solutions can enhance both the effectiveness and efficiency of learning experiences. The effectiveness of blended learning may depend on various factors such as learner characteristics, design features, and learning outcomes.
- 3. Efficiency:** With a well-planned blended learning strategy, training can be delivered to a broad audience using limited resources. Digital assets, such as

videos, recordings, and e-books, can be reused, making blended learning an efficient way to conduct training.

4. **Cost-Effectiveness:** By offering more online options in training programs, blended learning reduces travel and work time, making it a more cost-effective approach to training.
5. **Usability:** Well-designed blended learning solutions can offer a seamless transition between classroom and computer-based learning. Instructors can tailor content to learners' specific needs and interests, increasing motivation and improving learning outcomes.
6. **Accessibility:** By adopting a blended learning strategy, instructional time in the classroom is reduced, allowing more learners to access high-quality content at a lower cost. This also frees up instructors to develop more content.
7. **Covers All Learning Styles:** Effective blended learning caters to all learning styles through a variety of media and technologies.

Watson (2009) suggests that blended learning should be viewed as an educational approach that combines the social opportunities of the classroom with active, technology-enhanced learning in online environments. Blended learning requires a shift from lecture-based instruction to student-centered teaching, increasing interactions between students, instructors, and learning content, while integrating formative and summative assessments throughout the course.

## 2.2 Advantages of Blended Learning

Several advantages of blended learning have been highlighted in previous literature, including:

- Addressing individual differences among students and enhancing their academic achievement.

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- Offering flexible learning environments that are adaptable to different settings.
  - Providing opportunities for both traditional and alternative learning methods.
  - Encouraging active student participation, which fosters cognitive, emotional, and social development.
  - Reducing educational costs by increasing class capacity and minimizing expenses related to traditional or purely online education.
  - Promoting interaction and engagement, which enhances students' satisfaction with the learning process.
  - Developing new models for education that align with Saudi Arabia's Vision 2030, enhancing students' skills, and promoting effective use of learning resources.

Based on these advantages, the researchers concluded that blended learning helps students develop critical thinking and problem-solving skills, encouraging the use of diverse learning resources in a manner that aligns with Saudi Vision 2030.

### 2.3 Blended Learning Objectives:

Based on literature and studies that aimed to define the objectives of blended learning, such as the study by Abu Humaid et al. (2015), several objectives for using blended learning in education and learning can be summarized as follows:

1. **Saves Time, Effort, and Cost** compared to traditional or purely online education, enhancing student motivation, breaking the monotony, and considering individual differences among students. It is easy to implement in various environments and according to available resources.
2. **Improves Academic Achievement**, contributing to increased learning effectiveness and better educational outcomes by providing a stronger

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connection between learner needs and the objectives of blended learning, leading to higher academic performance compared to traditional learning.

**3. Connects Classroom and External Learning** opportunities, allowing students to interact with teachers outside formal class hours, fostering self-regulation skills, and enhancing higher-order thinking skills like analysis, synthesis, and problem-solving. It emphasizes self-learning according to students' capabilities and learning speed due to the flexibility of blended learning.

**4. Enhances Long-term Retention** of educational material by presenting content in multiple formats and providing interactive tools that aid in developing knowledge through exploration, research, and increased learner motivation. Integrating technology in classrooms increases students' interest, focus, and enthusiasm.

## 2.4 Importance of Blended Learning:

Blended learning has gained importance due to its advantages and characteristics, as previous literature indicates. Studies like Dangwal (2017) highlight its effectiveness in training environments, as it provides learners with guidance, feedback, and reinforcement from instructors.

Hillyard (2015) points out its significance in improving student experiences, developing faculty professional skills, and maintaining the quality of educational services. The flexibility and use of new technologies help achieve educational goals and promote teamwork in curriculum design.

Several studies, including those by Rajab (2017), Emad (2016), Khaled (2016), and Ameen (2015), emphasize the effectiveness of blended learning in enhancing various educational skills among university students.

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## 2.5 Blended Learning Challenges:

Yahya (2021) identified several key challenges that hinder the application of blended learning in the educational process, including:

- 1. Human Challenges:** Resistance to change and adherence to traditional learning methods among teachers, as well as the lack of certain skills among students, such as self-directed learning, participation, and the ability to use computers effectively.
- 2. Technical Challenges:** The need for a Learning Management System (LMS) or providing an e-course platform to support the blended learning approach.
- 3. Economic Challenges:** The high cost of devices and technological infrastructure needed to support blended learning, which can limit its implementation.

Additionally, the "Future Ready Schools" website (2019) highlighted other challenges facing blended learning, including:

- 1. Challenge One:** Maintaining the authenticity of the teacher's role while using technology in the classroom. It's easy for students to sit in front of pre-recorded educational videos, which may diminish the teacher's ability to build meaningful relationships with students.
- 2. Challenge Two:** Creating an effective self-learning environment where students have control over their learning pace, which can create inequalities. Some students may need more time to learn certain skills, and self-directed learning is a difficult skill that requires support.
- 3. Challenge Three:** Ensuring authentic mastery of learning, making sure that students are genuinely acquiring knowledge when working independently on computers, and verifying their understanding of the material.

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## 2.6 Requirements for Implementing Blended Learning:

**1. Teacher-Specific Requirements:** Shaban (2018) outlines several requirements for teachers to effectively implement blended learning, including:

- Designing educational processes that allow for continuous monitoring, guidance, and evaluation.
- Preparing course materials that are appropriate for an e-learning environment.
- Developing educational programs and content that fit the blended learning model.
- Establishing teaching and learning methods, such as cooperative learning and critical thinking.
- Designing electronic tests and evaluating students' performance.
- Addressing technical aspects of the e-learning environment.

**2. Student-Specific Requirements:** Based on Samhan's (2021) study, the requirements for students in transitioning to blended learning include:

- Actively participating in the educational process to achieve learning objectives, with proper training to address issues arising from the use of technology.
- Being adequately prepared to use information technology in their courses, equipped with the necessary skills to use multimedia in both printed and electronic learning environments.
- Engaging in electronic or face-to-face communication, interacting with their teachers and peers, especially during online workshops, and being trained on how to participate in discussions during lectures.



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**3. Administrative and Organizational Requirements:** These include defining levels of administration, roles, and responsibilities, as well as ensuring communication means. Kreit (2017) highlights that communication tools should include:

- **Email:** This tool allows students and course instructors to exchange emails, which can be used to send inquiries and submit assignments electronically.
- **Discussion Tool:** This feature enables students enrolled in a course to share their perspectives on topics related to the course. It plays a crucial role in the virtual learning environment by replacing the social presence found in traditional classrooms.
- **Synchronous Communication:** This refers to real-time interactions, such as virtual classrooms, video conferences, or chat rooms. **Asynchronous communication**, on the other hand, involves non-real-time exchanges, such as through email or discussion forums within a Learning Management System (LMS).

### 2.7 E-Learning via the Web:

E-learning is considered one of the most important technological innovations resulting from scientific and technological development. It focuses on incorporating advanced technology into the educational process, directly impacting teaching and learning in our modern era. Hassan (2021) mentioned that e-learning relies on utilizing modern teaching strategies through the internet to help learners study at the time and place that suits them. This is achieved through interactive content that utilizes multimedia (text, audio, video, and animation) delivered through electronic means such as computers and the internet.

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## 2.8 Components of the E-Learning System via the Web:

E-learning is based on several foundational elements, and studies by Al-Basel (2021), Al-Saleh and others (2018, p. 119), and Rashid (2017, p. 31) have identified the components of the e-learning system as follows:

- 1. Electronic Content:** Educational material is one of the most important elements of e-learning. The educational content is prepared using special software and technologies, comprising texts, videos, images, and various interactive mechanisms. Several requirements must be met for presenting the content via the web, including ease of use, clarity, attractiveness, and engagement. The content must also be appropriate for the targeted learners, with well-organized modules, opportunities for interaction, and freedom for learners to navigate through the content. Web-based educational media are also employed to enrich and enhance learning, and designing the content requires a suitable instructional design model.
- 2. The Medium:** This is the communication channel between the elements of the educational process, whether it's the internet, data networks, or any electronic communication medium that allows interaction between the teacher, learner, and content. In e-learning, the teacher is not only separated from the learner but also from the content. For instance, the teacher may be in one country, learners in another, and the content may be hosted on a website or scattered across multiple sites. Here, technology plays a crucial role in connecting these elements, which are not present in the same place or time. Thus, technology becomes indispensable in facilitating communication and interaction.
- 3. The E-Learner:** The e-learner is the individual who uses electronic means and e-learning systems to attend lessons, take exams, and interact with the teacher and other students in e-learning sessions. This learner utilizes e-learning

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methods, but the learner's nature does not change with the technology used; rather, what changes is the way or method of learning.

4. **The E-Teacher:** The teacher is the key element in any educational system. An e-teacher interacts electronically with the learner and supervises the learning process. This teacher could be within an educational institution or at home, equipped with specific technical and pedagogical skills, motivation, and prior knowledge to engage with online learning systems. The e-teacher is responsible for mastering the management of virtual classrooms and has evolved from being just an instructor to a facilitator of content and educational processes, acting as a guide or mentor.
5. **The E-Classroom:** This is the space where teachers interact electronically with students, delivering lessons via electronic communication systems before proceeding with course content. The e-classroom's primary function is to equip students with the skills and resources to foster positive interaction between themselves, teachers, and electronic curricula. The e-classroom also has a set of standards and metrics for assessing student performance.
6. **The E-Learning Environment:** Several software packages have been developed to manage various e-learning operations, known as E-Learning Environments (ELE). These environments act as databases for organizing different learning processes, such as delivering educational content, tracking students, and assignments. An e-learning environment serves as a platform designed to meet the specific educational needs of a course or a set of courses.
7. **E-Exams:** These are essential in evaluating students' performance remotely through electronic networks. E-exams are a key component of the e-learning process, providing students with the opportunity to assess their levels while offering feedback systems based on the results and grades obtained, thus

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contributing to achieving the educational objectives of e-learning.

**8. System Administrator:** This is a technical person responsible for managing the system, controlling its resources, managing sessions, updating content, and ensuring the continuity of interaction between the elements of the educational process.

### **3. Blended Learning Models via the Web (Individual/ Group)**

Learning methods or educational preferences of learners encompass four aspects: their cognitive style, their patterns of attitudes and interests, their inclination to seek learning situations that match their learning styles, and their tendency to use specific learning strategies rather than others. The multiple facets of learning styles comprise a mix of cognitive, emotional, and behavioral elements. Learning methods vary from group learning to individual learning and small group learning, as well as from direct learning to distance learning and computer or tablet-based learning methods, alongside other learning styles (Saeed, 2020). This section will review the concepts of individual learning and group learning, highlighting their main characteristics and the theoretical foundations of each.

#### **3.1 Individual Learning**

Undoubtedly, individual learning is one of the effective teaching methods that focus on the learner and consider individual differences among learners. It can be defined as learning that relies on the individual's self-activity, where the learner performs all required learning activities independently without the assistance of others. The learner is responsible for accomplishing learning tasks and achieving educational objectives, making it learner centered. It is based on freedom and complete responsibility for learning, choosing and organizing learning resources, and guiding and self-evaluating the learner according to their capabilities and personal

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preferences, as well as their individual learning pace to achieve the required educational objectives (Ahmed, Samah; Al-Jazzar, Abdul-Latif; Qurni, Amal, 2016).

### 3.2 Characteristics of Individual Learning

Afifi (2018, 109) indicated that individual learning has characteristics that allow the student to proceed at a pace and rate suitable for their abilities, independent of others' evaluations. It ensures serious participation in both the teaching and learning processes. Some characteristics of individual learning include:

1. Self-responsibility of the student when participating in positive activities.
2. Progressing in learning according to the individual's pace.
3. Control and mastery of the level of material comprehension.
4. Self-direction of the student.

### 3.3 Theories of Individual Learning

There are educational theories related to individual and collaborative teaching styles, among which are:

- 1. Constructivist Theory:** This theory is based on the premise that knowledge is not passively received by students but is built through their deep understanding of the subject. Ideas are not handed to students; rather, they must construct them and build their own concepts. Knowledge is generated through thinking and self-activity. Many constructivists share Vygotsky's views on the development of higher mental processes through interaction and dialogue; therefore, collaborative learning is considered valuable and meaningful (Brooks and Brooks, 1999). Individual learning is based on constructivist cognitive theory as its theoretical foundation. It relies on the

learner's activity in constructing their learning by transitioning from one educational unit to another and interacting with the components of each unit, keeping them in continuous engagement towards their knowledge (Badr, 2014, 90). One of the essential principles of constructivist theory is that the student should be the focal point of the educational process, encouraging them to search, experiment, and discover. It also focuses on the student's mind and the processes occurring within it, generating deep levels of knowledge within a framework based on social interactions, through which students build their knowledge and experiences. It is a cognitive theory that students rely on while practicing various activities, working individually to construct their knowledge through interaction with electronic content.

2. **Communicative Theory:** This theory is central to social networks, reflecting the social environment of students and linked to modern technologies, which traditional learning theories fail to explain the nature of learning occurring within them.
3. **Mastery Learning Theory:** This theory serves as the foundation for individual learning systems. Mastery learning does not allow performance in any skill to fall below 100%. A student's failure to reach this level indicates the need for re-learning until their performance level meets the mastery required for skill execution (Montasir, 2019, 66).
4. **Self-Report Theory:** Afifi (2018, 109) referred to self-report theory as a theoretical foundation for individual participation. This theory directs internal motivation toward autonomy; students are internally driven to enhance their competencies, and feelings of adequacy increase their internal engagement in all activities. In individual learning, students naturally lean toward believing they are participating voluntarily in activities rather than being coerced.

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**5. Behaviorist Theory:** There is a close connection between individual and collaborative learning and behaviorist theory, as behavior is an observable and measurable phenomenon. Behaviorist theory is the cornerstone of individual and collaborative learning, linked to the principles of learning. Changes in student behavior are interpreted through it; a student acquires behavior from the environment, which can be modified through provided learning resources that help alter their behavior to be socially desirable. The influence of stimuli presented to the student contributes to modifying their responses, distinguishing them from others.

**6. Social Learning and Social-Cognitive Theory:** The principles of social learning and social-cognitive theory provide a framework for micro-learning approaches. Khamis (2013, 19-23) noted that micro-learning occurs in a social context, with students learning individually or collaboratively, observing and noting the behaviors of others. This observation helps convert behavior and environmental stimuli into cognitive symbols and images stored in memory, equipping students with the ability to manage, organize, and reflect on themselves. Students have their standards and thoughts about good and bad behavior, selecting their actions and regulating their social ethical standards based on previous experiences, analyzing and reflecting on their experiences, and modifying their thoughts. Students acquire this through a dynamic, reciprocal, and continuous interaction among interpersonal influences, personal factors, and behavior.

#### 4. Group Learning

Ibrahim (2018) defines group learning as a method that relies on interactive activities within small groups, typically consisting of 3 to 5 individuals, aimed at achieving common goals that encompass cognitive aspects, skills, and attitudes. This is

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accomplished through students collaborating with each other, utilizing both printed and non-printed learning resources, with appropriate support from the teacher when needed.

#### 4.1 Characteristics of Group Learning

Ibrahim (2018) states that small group learning has several defining characteristics:

- 1. Diverse Strategies:** It is implemented through a range of strategies rather than a single approach, as teaching situations are collaborative. The group works together to achieve common goals, with each student contributing their efforts. In a group, each student plays two complementary roles: teaching and learning simultaneously, driven by intrinsic motivation. Thus, the effort invested in the situation can lead to lasting learning effects and their functionality.
- 2. Equal Opportunity for Success:** While everyone has a role in the group, all roles are interconnected, and the overall outcome is the success of the group. This represents effective learning resulting from effective teaching aimed at achieving various goals in cognitive areas, skills, and higher order thinking levels, focusing on collective activities that require prior planning and construction before execution.

#### 4.2 Elements of Group Learning

Samara and Al-Najjar (2018) outline the elements of group learning as follows:

- 1. Positive Interdependence:** Each student in the group feels that their success or failure is dependent on their peers' efforts.
- 2. Individual and Group Responsibility:** Each member of the group is responsible for contributing and interacting with their peers. To achieve the objectives of group learning, assistance should be provided to those who need it,



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ensuring that students learn together to enhance their future performance.

3. **Interaction Enhancement:** Each group member commits to providing assistance and positive interaction with their peers.
4. **Social Skills Development:** Students learn additional academic tasks and essential social skills for collaboration, such as decision-making, trust-building, conflict management, and leadership.
5. **Group Work Evaluation:** Members can discuss and analyze their success and collaboration in achieving their goals.

#### 4.3 Types of Collaborative E-Learning

Hassan (2018) identifies three types of collaborative e-learning:

1. **Formal Cooperative Learning Groups:** These are groups formed for a specific duration, ranging from a single class session to several weeks, where students work together to complete assigned educational tasks.
2. **Informal Cooperative Learning Groups:** These groups serve a specific purpose, such as preparing students psychologically and directing their attention to the material to be learned. This type is often used during direct instruction, which includes activities like lectures and presentations.
3. **Basic Cooperative Learning Groups:** These are long-term groups lasting at least a year, primarily aimed at providing support and assistance to all group members to achieve the desired success. The current research has chosen the formal cooperative learning group style due to its alignment with the research objectives and requirements for studying educational content (researching the Egyptian Knowledge Bank). Students in the experimental group were divided into groups, with goals and tasks determined and distributed among group members. Each group collaborated on educational tasks using digital mind maps

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from the Egyptian Knowledge Bank. A leader was chosen for each group, responsible for integrating individual contributions and managing interactions and discussions among members. The group leader also provides a final report on the outcomes and accomplishments of each task.

#### **4.4 Theoretical Foundations of Group Learning Strategy**

"Group learning is based on social constructivist theory and connective theory. The social constructivist theory posits that knowledge is constructed socially; therefore, integrating students into a knowledge community leads to social integration and the formation of new information through their social interactions, thereby deepening each learner's understanding" (Khalifa, 2016). The connective theory explains that learning is actionable knowledge acquired from external sources. This knowledge is distributed among people and objects, rather than owned by a single individual, and can only be acquired through communication with human and non-human sources. These sources can be represented by a network of nodes, each representing a source of knowledge (Abd El-Aaty, 2016).

### **5. Skills in Web Page Design**

This section will explore the concept of web page design skills through the literature addressing this area, detailing the types of web pages, the foundations of their design, and their characteristics.

#### **5.1 Concept of Web Page Design Skills**

Shaaban (2018) defines educational web pages as "a set of educational and technical principles considered during web page design to achieve predefined educational objectives. Web pages consist of a collection of interconnected pages that include images and text, uploaded to a web server and designed using HTML." Additionally, Khamis (2015, 886) defines it as "documents placed on a local server or hosted by

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an internet service provider, where the first page of the site is known as the homepage or start page, and the site is displayed through a web browser."

## 5.2 Characteristics of Educational Web Pages

There are several characteristics that distinguish educational web pages, as summarized by Hamid (2016):

- 1. Integration:** Refers to the coherence of elements within a web page to achieve the desired objectives.
- 2. Interactivity:** Means allowing user control over the display method based on their ability and desire to learn. There are four types of learner interaction: interaction with educational content, interaction with the teacher (synchronously or asynchronously), interaction with peers (synchronously or asynchronously), and self-interaction in preparing for learning from the web page.
- 3. Merging:** Refers to the integration of educational web page elements in a meaningful non-linear sequence according to cognitive theories that emphasize making learning meaningful.
- 4. Individuality:** Means centering the educational process around the learner, according to their unique abilities.
- 5. Hypermedia Utilization:** Web pages consist of hypermedia elements, such as written text, audio, static and dynamic images, videos, and hyperlinks.
- 6. Variety:** Educational web pages do not rely on a single element but instead encompass multiple elements, such as written texts, images, sounds, and videos.
- 7. Accessibility:** Once published, they are available to anyone, at any time and place.
- 8. Globality:** Learning can occur through a web page anywhere in the universe

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where internet connectivity is available.

**9. Engagement:** All parties involved in the educational process participate in web learning environments, enriching the educational experience.

### 5.3 Types of Webs Pages

Al-Rajai (2009, 10) categorizes web pages as follows:

- 1. Static Pages:** These are pages that do not change except through programming, and visitors cannot modify or input data into them. They are the least commonly used and are programmed using HTML.
- 2. Interactive Pages:** These are interactive internet pages that display data through a database imported by the pages for user presentation, allowing both the site administrator and page visitors to enter and modify data available in the database. They are the most used and are programmed using languages such as Visual Basic, Java, ASP, JavaScript, .NET with SQL Server Database, and PHP with MySQL Database.

### 5.4 Foundations of Web Page Design

Shaaban (2019) mentioned in her study the foundations of designing educational web pages, including:

- 1. Aesthetic Appeal of the Page:** While formatting and readability are important in web page design, the aesthetic element should not be neglected to avoid creating pages that lack interest. Appropriate use of space, colors, and fonts is essential to attract attention to important elements, in addition to the page loading speed. However, moderation in this use should be observed.
- 2. Avoiding Slow Page Load Times:** Several factors contribute to this issue, with large images being a primary cause for slow page loading. Pages with many

images, shapes, and drawings can represent poor design. Additionally, minimizing animated graphics and Java applications is advised, as they can enhance attractiveness but also slow downloading times and distract the learner.

- 3. Ease of Navigation:** Navigation tools within the site should be easy and clear, allowing learners to easily recognize them on every page.
- 4. Clarity and Readability:** Designers should use short sentences, ensuring that no line exceeds approximately 50 to 60 characters. Choosing a clear font and providing adequate white space are all factors that help increase the readability of web pages.
- 5. Conciseness:** The page size should not exceed the equivalent of three screens to prevent learners from having to scroll for extended periods to find the information they need. Long pages also increase the time required to analyze the page in the browser. Therefore, it is preferable to use short sentences organized into lists, as this draws attention to important elements within the page.

## 6. Study Methodology and Procedures

### 6.1 Study Method

The researchers used a quasi-experimental method in the current study to verify the study hypotheses, which involves applying a measurement tool (skill test) post-intervention. This method collects data while implementing a treatment or intervention by non-random assignment of one or more experimental groups (Al-Qahtani, Klibi, Al-Dawood, 2021). This method is connected to the development of web page design skills among high school female students. The experimental design, based on the study variables, relies on a two-group experimental design, allowing for the exploration of questions related to the fundamental impact of the first independent variable with two levels (individual vs. group). The first experimental

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group studies through individual blended learning via the web, while the second experimental group studies through group blended learning via the web.

## 6.2 Study Population and Sample

The study population consists of all first-year high school female students at Sundus Bint Khalid School in Eastern Riyadh. The study sample will be limited to a representative group of 40 students, divided into two experimental groups. The first experimental group will consist of 20 students studying through individual blended learning via the web, while the second experimental group will also comprise 20 students studying through group blended learning via the web.

## 6.3 Study Tools and Application Procedures

The researchers reviewed educational literature in the fields of e-learning and blended learning, as well as previous studies that focused on building training programs aimed at teaching and developing skills related to designing educational web pages, alongside instructional design models. The researchers found that the instructional design model by Al-Jazzar aims to assist student teachers and researchers in developing lessons and educational units as an effective educational system via the web. This model consists of five main phases, each containing sub-steps. The researchers utilized this model in line with current trends and innovations in learning, as it aligns with the mechanisms of the current research.

Table (1): Abdul Latif Al-Jazaar (2013) Instructional Design Model in E-Learning Environments

| Phase                              | Description  |
|------------------------------------|--|
| <b>1. Study and Analysis Phase</b> | - Identify learner characteristics and study the reality of educational resources and materials.<br>- Determine the educational need for the topic or the general purpose for the learner.   |
| <b>2. Design Phase</b>             | - Formulate learning objectives behaviorally, analyze them, and sequence them.<br>- Identify the elements of educational content and develop criterion-referenced tests.<br>- Select learning experiences, group arrangements, and teaching methods for each objective.<br>- Choose educational media and materials.   |
| <b>3. Production Phase</b>         | - Design the message using multimedia elements.<br>- Design educational events and elements of the learning process.<br>- Design navigation methods and the interactive interface of the program.<br>- Design the scenario for the web-based learning program.<br>- Design the implementation strategy for the education program, including learner interaction with the program, materials, external media, and hardware requirements.<br>- Acquire, modify, or produce multimedia elements.<br>- Digitize multimedia elements and store them.<br>- Implement the program using a broadcasting system and produce the scenario for the web-based learning program and external media.<br>- Author the program using a broadcasting system and produce the scenario for the web-based learning program and external media. |
| <b>4. Evaluation Phase</b>         | - Conduct a pilot test for formative evaluation.<br>- Conduct an extended test for summative/final evaluation.   |
| <b>5. Usage Phase</b>              | - Implement field use, continuous monitoring, and evaluation.  |

Accordingly, the procedures were carried out as follows:

### **First: Study and Analysis Phase:**

The analysis phase included the following steps:

**A. Identify Learner Characteristics:** The characteristics of the students were analyzed based on:

- General characteristics of growth according to age: The students are in the first year of high school and are 15 years old.
- Special characteristics and abilities: Physically, the students are normal and

possess typical auditory and visual abilities, in addition to their interest in e-learning and the use of educational smart device programs.

- Entry behavior: Students at this stage could use computers and their software, and they also have prior knowledge of programming topics from middle school.

**B. Determine the Educational Need for the Topic or the General Purpose for the Learner:** The researchers chose the topic of learning, which is (Web Page Design), as part of the Digital Technology curriculum for high school. Upon reviewing previous references and research, the researchers found that an integrated learning environment had not been designed for training in web page design skills, and they saw a need to design such an environment.

**C. Study the Reality of Educational Resources and Materials:** Implementing blended learning requires the availability of educational environment capabilities that assist the process. The researchers tried to utilize these capabilities as much as possible, including:

1. Using a computer lab with 21 devices.
2. Employing an interactive screen in learning resources.
3. Utilizing a whiteboard in learning resources.
4. Availability of smart devices or computers for students at home.

## Second: Design Phase

**A. Define and Formulate the Operational Objectives of the Program:** Defining learning objectives is a fundamental step in planning any educational program. This process includes a series of steps focused on identifying and analyzing the required tasks in terms of knowledge, skills, and attitudes, leading to the



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establishment of the essential steps of the program to serve these objectives. Therefore, the researchers defined the objectives as follows:

**1. Behavioral Objectives:** The behavioral objectives were defined in light of the learning topics related to web page design skills in both the cognitive and skill areas, as detailed below:

1. The student should explain the term "website."
2. The student should define "hypertext."
3. The student should define the term "tag."
4. The student should infer the function of hyperlinks.
5. The student should clarify the term "web page."
6. The student should enumerate the contents of a web page.
7. The student should infer the advantages of Hypertext Markup Language (HTML).
8. The student should state the concept of tags within a web page.
9. The student should enumerate the components of a web page.
10. The student should classify the types of lists.
11. The student should use an HTML editor.
12. The student should use the <img> tag.
13. The student should explain the properties of HTML tags.
14. The student should differentiate between the closing tag and the opening tag <P>.
15. The student should identify the tag for creating a table.

16. The student should identify how many times to move the text.
17. The student should arrange the tags when defining headings from highest to lowest.
18. The student should correctly choose the function of the blank value.
19. The student should experiment with the <a> tag to define hyperlinks.
20. The student should choose the tags for text modification.
21. The student should use the correct tag to write text in italics.
22. The student should correctly apply the code to set a link for an image.
23. The student should write the code correctly to add text.
24. The student should rewrite the code correctly to add a line break within a paragraph.

**2. Determine the Elements of Educational Content:** Identifying learning topics is an important step in preparing the program. The study divided the program into six lessons according to the Digital Technology curriculum, as follows:

- Lesson 1: Creating a web page (using an HTML editor, defining tags, defining labels).
- Lesson 2: Formatting texts (writing and formatting text).
- Lesson 3: Creating and modifying tables.
- Lesson 4: Inserting images and videos.
- Lesson 5: Adding animated texts.
- Lesson 6: Hyperlinks.

**3. Design Criterion-Referenced Test: Preparing Measurement Tools:** The study tools were prepared, which include the cognitive and skill tests, by following these steps:

- Preparing the cognitive test related to web page design skills: The cognitive test for the study was prepared according to the following steps: A. Purpose of the Test: The purpose of the test was to measure the cognitive aspects that the first-year high school students (the sample of the study) learned in the web page design unit. B. Preparing the Test Specifications Table: The specifications table for the test was prepared based on the levels of objectives, as follows:

Table (1): Test Specifications

| Lessons            | Recall | Understanding | Analysis | Number of Questions | Relative Weight |
|--------------------|--------|---------------|----------|---------------------|-----------------|
| Lesson 1           | 4      | 2             | 1        | 7                   | 37.5%           |
| Lesson 2           | 1      | -             | -        | 1                   | 17.5%           |
| Lesson 3           | -      | -             | -        | -                   | 8%              |
| Lesson 4           | -      | -             | -        | -                   | 8%              |
| Lesson 5           | -      | -             | -        | -                   | 8%              |
| Lesson 6           | -      | 1             | 1        | 2                   | 21%             |
| <b>Total</b>       | 7      | 8             | 9        | 10                  | 100%            |
| <b>Percentages</b> |        | 29.5%         | 33%      | 37.5%               | 100%            |

It is evident from Table (1) that the questions in the cognitive test are representative of all the lessons in the selected educational unit from the Digital Technology 1-1 curriculum and assess the cognitive levels (Recall, Understanding, Analysis).

**C. Formulating the Test in its Initial Form:** After completing the specifications table, which included three levels (Recall, Understanding, Analysis), the researchers prepared the test questions. The initial form of the questions consisted of (10) questions, and the researchers chose objective questions, as this type of question is the most widespread because it is scored objectively, free from the

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subjectivity of the examiner, and has high validity and reliability. The researchers considered the following points when formulating the test items, as shown in Appendix (1):

1. The items should be sound, free of linguistic errors, clear, specific in purpose, and devoid of ambiguity.
2. The items should be suitable for the cognitive level of the students.
3. The alternatives should be clear and consistent with the introduction, with only one alternative being the correct one.

**D. Test Instructions:** The researchers wrote the instructions precisely and in simple language suitable for the students' level. Each student was asked to read the instructions carefully before starting to answer the questions.

**E. Testing the Test:** The test was applied to a pilot sample consisting of (10) students from the first year of high school at Sundus Bint Khalid Secondary School, which was outside the main sample, to calculate the difficulty and discrimination indices for the test items, determine the test duration, calculate the test's reliability coefficient, and calculate the test's content validity, as follows:

**Determining Test Duration:** The test duration was calculated based on the time taken by the first student who finished answering the test and the time taken by the last student to solve the test questions, followed by calculating the average time. Thus, the test duration was determined as follows:  $(8 + 4) \div 2 = 6$  minutes.

**Difficulty and Discrimination Indices:** The difficulty and discrimination indices for the test items were calculated. The difficulty index measures the importance of the test items in assessing the validity and suitability of the test for measurement purposes. The percentage was calculated as shown in the following table:

Table (2): Difficulty and Discrimination Indices for the Cognitive Test

| Question Number | Number of Correct Answers | Number of Incorrect Answers | Difficulty Index | Discrimination Index |
|-----------------|---------------------------|-----------------------------|------------------|----------------------|
| 1               | 10                        | 0                           | 100%             | 0%                   |
| 2               | 5                         | 5                           | 50%              | 50%                  |
| 3               | 10                        | 0                           | 100%             | 0%                   |
| 4               | 4                         | 6                           | 40%              | 60%                  |
| 5               | 6                         | 4                           | 60%              | 40%                  |
| 6               | 10                        | 0                           | 100%             | 0%                   |
| 7               | 6                         | 4                           | 60%              | 40%                  |
| 8               | 9                         | 1                           | 90%              | 10%                  |
| 9               | 10                        | 0                           | 100%             | 0%                   |
| 10              | 10                        | 0                           | 100%             | 0%                   |

It is evident from Table (2) that the difficulty index values ranged from 40% to 100%, while the discrimination index values ranged from 0% to 60%, and all values are acceptable for application.

**Test Scoring:** One point was assigned for each item answered correctly, and zero for incorrect answers, resulting in a final score for the test of (10) points.

**Reliability of the Test:** The reliability coefficient of the cognitive test was calculated using the "Spearman-Brown" formula, resulting in a value of (0.803), which is statistically acceptable, indicating that the content of the cognitive test is characterized by reliability.

**Determining the Validity of the Test:** The test was presented to a group of expert judges in the field of computer science to benefit from their opinions in refining the test. The researchers made the adjustments agreed upon by the judges, confirming the test's validity (with a value of 0.89).

**The Test in its Final Form:** After preparing the test questions and then presenting them to the judges to ensure the test's validity and reliability, it was prepared in its final form.

## 2. Preparing the Skills Test:

The skills test for the study was prepared following these steps:

**Defining the Purpose of the Test:** The purpose of the test was to measure the skills acquired by the first-year high school students (the sample of the study) in the web page design unit.

**Preparing the Specifications Table:** The specifications table for the test was prepared based on the levels of objectives, as follows:

Table (3): Specifications of the Skills Test

| Lessons      | Application | Understanding | Analysis | Number of Questions | Relative Weight |
|--------------|-------------|---------------|----------|---------------------|-----------------|
| Lesson 1     | 2           | -             | 1        | 3                   | 22%             |
| Lesson 2     | 4           | -             | 2        | 6                   | 43%             |
| Lesson 3     | -           | 1             | -        | 1                   | 7%              |
| Lesson 4     | 2           | -             | -        | 2                   | 14%             |
| Lesson 5     | -           | 1             | -        | 1                   | 7%              |
| Lesson 6     | 1           | -             | -        | 1                   | 7%              |
| <b>Total</b> | 9           | 2             | 3        | 14                  | 100%            |

It is evident from Table (3) that the questions in the skills test represent all the lessons in the selected educational unit from the Digital Technology 1-1 curriculum and assess the cognitive levels (Application, Understanding, Analysis).

## Formulating the Test in its Initial Form:

After completing the specifications table, which included three levels (Application, Understanding, Analysis), the researchers prepared the test questions. The initial form of the questions consisted of (14) questions, and the researchers chose objective

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questions, as this type of question is more widespread because it is scored objectively, free from the subjectivity of the examiner, and has high validity and reliability. The researchers considered the following points when formulating the test items:

1. The items should be sound, free of linguistic errors, clear, specific in purpose, and devoid of ambiguity.
2. The items should be suitable for the cognitive level of the students.
3. The alternatives should be clear and consistent with the introduction, with only one alternative being the correct one.

**Test Instructions:** The researchers wrote the instructions precisely and in simple language suitable for the students' level. Each student was asked to read the instructions carefully before starting to answer the questions.

**Testing the Test:** The test was applied to a pilot sample consisting of (10) students from the first year of high school at Sundus Bint Khalid Secondary School, which was outside the main sample, to calculate the difficulty and discrimination indices for the test items, determine the test duration, calculate the test's reliability coefficient, and calculate the test's content validity, as follows:

**Test Duration:** The test duration was calculated based on the time taken by the first student who finished answering the test and the time taken by the last student to solve the test questions, followed by calculating the average time. Thus, the test duration was determined as follows:  $(11 + 6) \div 2 = 8.5$  minutes.

**Difficulty and Discrimination Indices:** The difficulty and discrimination indices for the test items were calculated as shown in the following table:

Table (4): Difficulty and Discrimination Indices for the Skills Test

| Question Number | Number of Correct Answers | Number of Incorrect Answers | Difficulty Index | Discrimination Index |
|-----------------|---------------------------|-----------------------------|------------------|----------------------|
| 1               | 8                         | 2                           | 80%              | 20%                  |
| 2               | 9                         | 1                           | 90%              | 10%                  |
| 3               | 3                         | 7                           | 30%              | 70%                  |
| 4               | 7                         | 3                           | 70%              | 30%                  |
| 5               | 4                         | 6                           | 40%              | 60%                  |
| 6               | 3                         | 7                           | 30%              | 70%                  |
| 7               | 9                         | 1                           | 90%              | 10%                  |
| 8               | 4                         | 6                           | 40%              | 60%                  |
| 9               | 4                         | 6                           | 40%              | 60%                  |
| 10              | 4                         | 6                           | 40%              | 60%                  |
| 11              | 4                         | 6                           | 40%              | 60%                  |
| 12              | 4                         | 6                           | 40%              | 60%                  |
| 13              | 6                         | 4                           | 40%              | 60%                  |
| 14              | 7                         | 3                           | 70%              | 30%                  |

It is evident from Table (4) that the difficulty index values ranged from 40% to 90%, while the discrimination index values ranged from 10% to 60%, and all values are acceptable for application.

**Reliability of the Test:** The reliability coefficient of the skills test was calculated using the "Spearman-Brown" formula, resulting in a value of (0.827), which is statistically acceptable. This indicates that the content of the skills test is characterized by reliability.

**Validity of the Test:** The test was presented to a group of expert judges in the field of computer science to benefit from their opinions in refining the test. The researchers made the adjustments agreed upon by the judges, confirming the test's validity (validity by the judges). The test validity was calculated by taking the square



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root of the reliability coefficient of the test, resulting in a self-validity of (0.90), indicating a high reliability coefficient, which reflects an acceptable level of reliability for the test.

**Test Scoring:** One point was assigned for each item answered correctly, and zero for incorrect answers, resulting in a final score for the test of (14) points.

**Preparing the Test in its Final Form:** The test questions were prepared and then presented to the judges to ensure the test's validity and reliability.

**Choosing the Interaction and Branching Design:** The researchers chose a branched hierarchical format, as it is the most suitable form of interaction with the program menus, which is the subject of the research. This format provides the learner with a list of options that lead to more lists and choices. The researchers specified the buttons and menus separately, allowing the user to interact with the main screen of the program and navigate to any part of the program through a main menu that directs them to any stage of the program. An exit button was placed on all program screens for the user to exit the program for any reason, in addition to a back button for the presentation program, facilitating easy navigation between program elements.

**Determining the Navigation Style:** The researchers used a linear style, as the linear program incorporates the following principles:

- A step-by-step learning system.
- Required responses initiated by the learner.
- Reinforcement for each response based on the learner's ability to identify the correct answer.
- Each student learns at her own pace.

The researchers utilized several programs for designing web pages, as follows:

Table (5): Names of Programs Used in Design

| Program Name | Function   |
|--------------|--|
| Wordwall     | An online platform for designing interactive activities with a variety of templates based on question formats. |
| Canva        | An online platform for designing logos, videos, and images.  |
| Google Site  | A platform that allows users to create websites.   |
| YouTube      | A platform for uploading videos through the user's channel.  |

The researchers used the web-based learning approach, which is pioneering for the student, as it presents and explains the learning topic in a series of small, sequential units, in a simple and engaging manner, allowing the learner to navigate through the program easily, either forward or backward.

**Implementing the Learning Strategy:** The web page contains six lessons, and each student studies each of the six previously outlined lessons, then answers the lesson's question, continuing until reaching the sixth lesson and then the skills test at the end of the unit.

**Selecting Program Building Elements:** The researchers specified the content and elements of the program by choosing the scientific content for the program and explaining each part through videos and images to clarify the topics.

**Executive Design of the Program (Scenario):** The researchers prepared the program scenario design and clarified the text placements according to the shape and size of the screen, organizing the placement of buttons and main and subheadings to allow the learner easy navigation between program elements.

### Third Stage: Production

- **Producing Multimedia Elements:** The researchers utilized Canva to design images and logos related to the content, creating them in line with the topics.

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- **Digitizing Multimedia:** In this step, the multimedia was prepared and uploaded to YouTube and Google Drive for the actual preparation of the website components and production elements.
  - **Authoring the Program Using the Authoring System:** The learning program scenario was developed based on the web and external media.
  - **Educational Videos Production:** The educational videos for the five topics were designed by the researchers through Canva and then uploaded to YouTube for easy link embedding and sharing with students. Additionally, a presentation for the sixth topic was designed and uploaded to Google Drive. Google Sites was used to design the website and place the educational materials.

#### Fourth Stage: Evaluation

1. **Formative Evaluation:** In this phase, the researchers conducted formative evaluations of the website by presenting it to a group of judges and experts in educational technology.
2. **Pilot Testing for Formative Evaluation:** The website was tested on a sample of first-year high school students, and a search tool (the skills test) was applied to ensure its validity and reliability.
3. **Expanded Testing for Summative Evaluation.**

#### Fifth: The Utilization Phase:

- A. **Field Usage:** The study began applying to the research sample, following these steps:
  1. Educational media and interactive activities were designed for the content.
  2. A team was created through the Teams application that included the sample students.

3. Instructions were clarified for the students during the class, and they were divided into two groups (individual and group).
4. The interactive screen was utilized to display the unit's contents during the class according to the specified sequence.
5. Students used the website to review lessons after class.
6. Continuous monitoring of the students during the class and answering their inquiries.
7. The link to the cognitive-skill test was shared with the students, and their answers to the questions were recorded.
8. Grades were recorded, and statistical operations were performed to test the validity of the differences and reach conclusions.

**B. Continuous Monitoring and Evaluation:** During the implementation of the study on the sample, the researchers monitored the students.

**C. Statistical Methods:** To serve the study's purposes and analyze the data, several statistical methods were used to address the study questions, employing the Statistical Package for Social Sciences (SPSS). These methods included: the arithmetic mean (AV), standard deviation (SD) to identify the extent of deviation or dispersion of responses from the members of the two experimental groups, and to calculate the reliability of the test using the "Spearman-Brown" formula and the (T-Test) to determine the significance of the difference between the mean scores of individuals in the two experimental groups in applying the measurement tools and to identify the significance level.

## 7. Study Results and Discussion

### 7.1 Normal Distribution Test for the Study Sample:

To achieve this goal, the Wilk and Kolmogorov test, as well as the Shapiro-Wilk test, were used to determine the appropriate statistical test to verify the study hypotheses. The results were as follows:

Table (6): Normal Distribution Test for the Sample:

| Tool                      | Wilk and Kolmogorov Test | Shapiro-Wilk Test |
|---------------------------|--------------------------|-------------------|
|                           | Statistic                | Sig.              |
| Individual Cognitive Test | 0.288                    | 0.131             |
| Individual Skill Test     | 0.239                    | 0.200             |
| Group Cognitive Test      | 0.233                    | 0.200             |
| Group Skill Test          | 0.530                    | 0.200             |

From the above table, it is evident that the value (Sig) in both the Wilk and Kolmogorov test and the Shapiro-Wilk test is ( $0.05 >$ ), indicating that they are not statistically significant. This means that the previous scores follow a normal distribution. Therefore, parametric statistics can be used to analyze the results.

### 7.2 Answering the Study Questions

To answer the first question, which states: "What is the effect of differing blended learning styles (individual - group) via the web on the cognitive development associated with web page design skills among high school students?" and to verify the validity of the experimental hypothesis that states: "There is no statistically significant difference at the 0.05 significance level between the mean scores of the first experimental group and the second experimental group in the post-application of the cognitive test related to web page design skills due to the fundamental effect of differing blended learning styles (individual - group)." To test the validity of this hypothesis, statistical processing was performed using the (t-test) for two

independent samples to compare the scores from the cognitive test application (individual, group) in the post-test.

Table (7): T-value and Statistical Significance between the Mean Scores of the First and Second Experimental Groups in the Cognitive Test:

| Group               | Tool           | N  | M     | SD   | Degrees of Freedom | T-value | Significance | Effect Size |
|---------------------|----------------|----|-------|------|--------------------|---------|--------------|-------------|
| First Experimental  | Cognitive Test | 20 | 15.11 | 2.92 | 23                 | 8.031*  | Significant  | 0.74        |
| Second Experimental |                |    | 5.17  | 1.17 |                    |         |              |             |

Table (7) shows that the calculated T-value (8.031) is significant at the (0.05) level and both sides, with 23 degrees of freedom, indicating statistically significant differences between the first and second experimental groups in the post-application of the cognitive test in favor of the first experimental group. Thus, the first experimental hypothesis of the study was rejected; there is a statistically significant difference at the (0.05) level between the mean scores of the first experimental group (using individual blended learning) and the second experimental group (using group blended learning) in the post-application of the cognitive test in favor of the first experimental group.

As Table (7) illustrates, the effect size equals (0.74), indicating a very large contribution percentage from the independent variable represented by individual blended learning via the web in cognitive achievement.

To answer the second question: "What is the effect of differing blended learning styles (individual - group) via the web on the skill development associated with web page design skills among high school students?" To verify the validity of the experimental hypothesis that states: "There is no statistically significant difference at the 0.05 significance level between the mean scores of the first experimental group

and the second experimental group in the post-application of the skill test related to web page design skills due to the fundamental effect of differing blended learning styles (individual - group)." To test the validity of this hypothesis, statistical processing was performed using the (t-test) for two independent samples to compare the scores from the skill test application (individual, group) in the post-test.

Table (8): T-value and Statistical Significance between the Mean Scores of the First and Second Experimental Groups in the Skill Test:

| Group               | Tool       | N  | M     | SD   | Degrees of Freedom | T-value | Significance | Effect Size |
|---------------------|------------|----|-------|------|--------------------|---------|--------------|-------------|
| First Experimental  | Skill Test | 20 | 10.37 | 2.50 | 23                 | 2.169*  | Significant  | 0.17        |
| Second Experimental |            |    | 7.83  | 2.48 |                    |         |              |             |

Table (8) shows that the calculated T-value (2.169) is significant at the (0.05) level and both sides, with 23 degrees of freedom, indicating statistically significant differences between the first and second experimental groups in the post-application of the skill test in favor of the first experimental group, that is, in favor of individual blended learning via the web. Thus, the second experimental hypothesis of the study was rejected; there is a statistically significant difference at the (0.05) level between the mean scores of the first experimental group (using individual blended learning) and the second experimental group (using group blended learning) in the post-application of the skill test in favor of the first experimental group,

## 8. Discussion of the Study Results

The results of the study can be interpreted as follows:

The results shown in Table (7) indicate the presence of statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) between the mean scores of the experimental group using individual blended learning and the experimental group

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using group blended learning in the post-test for cognitive achievement, favoring the group using individual blended learning in the digital technology course among first-year secondary female students. These differences can be attributed to the variation in the use of blended learning styles (individual – group) in student learning, which positively impacts the enhancement of their cognitive and skill achievement.

The results shown in Table (8) also indicate statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) between the mean scores of the experimental group using individual blended learning and the experimental group using group blended learning in the post-test for skill achievement, again favoring the group using individual blended learning in the digital technology course among first-year secondary female students. These differences can similarly be attributed to the variation in the use of blended learning styles (individual – group) in student learning, which has a positive effect on improving their cognitive and skill achievement.

Using blended learning in the learning process helped students develop their skills in web page design, depending on the learning style (individual group). Additionally, providing scientific material for students on the created web page, which they can access at any time that suits them, contributed to this. Furthermore, the design of the educational material, which included text, images, and audio, positively engaged multiple senses of the students, facilitating their learning of the knowledge. The various educational activities at the end of each lesson allowed for repetition and practice at home, leading to increased understanding of the educational material.

Moreover, the immediate feedback provided at the end of each activity helped students identify incorrect and correct answers, further developing their web page design skills. Blended learning also kept pace with the technological advancements occurring in the twenty-first century by presenting educational materials in a technical and appealing manner to students. The current study's results align with



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findings from previous studies that affirmed the effectiveness of blended learning, including studies by (Al-Mutairi, 2016; Saleh, 2018; Al-Saqaria, 2020; Asiri, 2021). The results of the current study also concur with those of studies highlighting the effectiveness of individual blended learning, such as the study by Muhammad (2018).

## 9. Recommendations of the Study

Based on the study's findings, the researchers recommend the following:

1. Utilizing blended learning to enhance web page design skills as implemented in the current study for first-year secondary students, due to its positive effect on developing their cognitive and skill aspects.
2. Expanding the use of blended learning, whether individual or group, in explaining various subjects for first-year secondary students and raising awareness among students and teachers about it.
3. Working to provide the resources, tools, and laboratories in schools that enable teachers to implement blended learning in teaching students.
4. Adopting a strategic plan that outlines how to integrate and adopt blended learning in schools and emphasizing blended learning as a promising solution for transitioning from traditional teaching to blended learning in schools.

## 10. Suggestions for Future Studies

Considering the current study's results, which demonstrated a positive effect of employing the blended learning strategy in developing web page design skills among first-year secondary students, the researchers suggest conducting further studies and research as follows:

1. The impact of an electronic learning environment based on blended learning

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- strategy on academic achievement among secondary school students.
2. The effect of using the blended learning strategy in teaching different courses in other regions of the Kingdom of Saudi Arabia.
  3. The impact of e-learning and blended learning on scientific thinking, academic achievement, and retention of learning outcomes.
  4. The prevalent learning styles and their relationship with satisfaction levels regarding blended learning.
  5. Employing the blended learning strategy in developing web page design skills.
  6. The impact of using blended learning in teaching computer science on developing specific web page design skills.
  7. Conducting additional research and studies to show the effect of using the blended learning strategy on improving students' attitudes towards it in general.
  8. Conducting more studies and research that measure the effect of the blended learning strategy on improving the educational process in general.
  9. Conducting additional studies and research using broader samples across different variables, such as gender, and at other educational stages.

## References

- Aatif Abu Hamid Al-Shurman. (2015). Blended learning and flipped learning. Amman: Dar Al-Masira for Publishing and Distribution.
- Abd Al-Aati, Hassan. (2016). Communication: Learning theory in the digital age. Knowledge Journal.
- Abd Al-Aati, Muhammad. (2016). Blended learning technology. Educational Library.
- Abdul Aal, Ahmed. (2021). The interaction between feedback styles (informative-corrective-explanatory) and cognitive style (dependent-independent) in the flipped learning environment to develop web page production skills for preparatory stage students, Arab Society for

Educational Technology, 289-358.

- Abdul Aziz, Dua. (2019). The post-analysis of the impact of blended learning on science learning outcomes. *Journal of Education, Menoufia University*, 34(2), 160-229.
- Abu Attiah, Jawhara Darwish. (2021). The effectiveness of blended learning using Google Classroom on the academic achievement of fourth-grade students and their attitudes towards mathematics. *Journal of Educational and Psychological Studies*, 15(1), 138-145.
- Abu Attiah, Jawhara; Al-Kharabsheh, Banan. (2019). A comparative study on the effect of e-learning and blended learning on scientific thinking, academic achievement, and retention of learning outcomes among primary stage students in Jordan. *Journal of Educational Sciences*, 37(2-4), 321-362.
- Afifi, Muhammad. (2018). The interaction between synchronous and asynchronous training styles, blended through virtual classrooms, and levels of participation (individual, group) and its impact on developing skills in designing and producing animated graphics and satisfaction with the learning environment among education college students, *Egyptian Society for Educational Technology*, 28(4), 73-188.
- Ahmed, Samah; Al-Jazzar, Abdul Latif; Qurni, Amal. (2016). The strategies of individual and cooperative education in web-based learning programs: Is there an impact on developing problem-solving skills among educational researchers? *Scientific Research in Education*.
- Al-Ajmi, Sarah; Al-Orfaj, Abeer. (2018). Barriers to applying blended learning in secondary education in Kuwait from the perspective of female teachers. *International Journal of Educational Research*, 7(3), March, 46-54.
- Al-Basel, Raba Mohammed. (2021). The effectiveness of a web-based e-learning environment based on a blended learning strategy and its impact on delivering academic courses to students at Taibah University in the Kingdom of Saudi Arabia. *Arab Society for Educational Technology*.
- Al-Bayat, Manal; Abu Al-Tayyib, Muhammad; Al-Nuaimat, Sajida. (2020). Dominant learning patterns and their relationship to satisfaction levels with blended learning. *Arab Universities Union Journal for Higher Education Research*, 40(1), 192-173.
- Al-Essa, N (2018). The Impact of Using Edmodo as A Blended Learning Medium on Promoting Saudi EFL Female Secondary. *Arab World English Journal* (November 2018). PP. 1-112. Thesis ID 221, DOI: <https://dx.doi.org/10.24093/awej/th.221>.

- 
- Ali, Ashraf. (2017). The impact of using blended learning and problem-solving strategies on developing skills in using cloud computing applications in scientific research among graduate students. Arab Research in Quality Education, 8, 175-220.
  - Al-Qahtani, Hamad Muhammad; Klibi, Rasha Abdullah; Al-Dawood, Manal Saad. (2021). Academic writing and scientific publishing according to the American Psychological Association Publication Guide, Jeddah.
  - Al-Rajai, Yusuf. (2009). Designing electronic websites, first edition, electronic copy, retrieved January 9, 2021.
  - Al-Saleh, et al. (2018). The effectiveness of the blended learning approach in developing biological literacy among high school students in the Kingdom of Saudi Arabia. Journal of Educational Sciences, 19(2), 116-128.
  - Al-Saqriya, Rabe'a. (2020). The impact of using blended learning on developing some 21st-century skills among 11th-grade female students in Islamic education. Studies in Educational Sciences, 71-90.
  - Al-Sayed, Emad. (2016). The impact of using blended learning in teaching computer science on developing some skills in PowerPoint among general diploma students in the industrial materials department and their attitudes towards it. Journal of Education.
  - Al-Shahwan, Arubah Ahmad Hamid. (2014). The impact of blended learning on direct achievement and reflective thinking of first-year secondary female students in the subject of management information systems [Unpublished Master's Thesis]. Middle East University.
  - Al-Sheikh, Hani Muhammad Abdu. (2014). The validity of peer assessment: the impact of the interaction between peer assessment style and their identity style in the electronic collaborative learning environment on cognitive, skill, and educational product quality, Egyptian Society for Educational Technology, 4(24).
  - Al-Shurman, Aatif. (2015). Blended learning and flipped learning. Dar Al-Masira for Publishing and Distribution.
  - Al-Zahrani, Izzah Muhammad Gharam Allah. (2019). Employing blended learning strategy in developing web page design skills among seventh-level female students at the College of Education, Al-Baha University. Journal of Education, Assiut University, 4(35), 381-393.
  - Asiri, Amal, et al. (2021). The impact of using blended learning on the academic achievement of third-grade female students in English vocabulary. Youth Researchers Journal in

Educational Sciences, 174-201.

- Badr, Ahmed. (2014). The interaction between the learning strategy (individual/group) using digital learning objects and cognitive capacity (high/low) and its effect on immediate and delayed achievement among preparatory stage students, Egyptian Society for Educational Technology, 1, 189-238.
- Bahout, Abdul Jawad, et al. (2021). The impact of an interactive online course on the performance aspects of web page design skills among sixth-grade students, Journal of Education, 127-154.
- Dangwa, L; Lata, K. (2017). Blended Learning: An Innovative Approach. Universal Journal of Educational Research, (5).1.p129-136
- Future Ready Schools® (FRS). (2019). The 3 Biggest Challenges and How to Overcome Them, Aug, <https://futureready.org/the-3-biggest-challenges->
- Haider, M. (2020). Covid-19: will blended learning become the future of education. <https://acerforeducation.acer.com/blended-learning/covid-19-willblended-learning-become-the-future-of-education>.
- Hamdi, Amira, et al. (2019). The impact of distributed participatory learning on developing web page design skills, Journal of Education, 671-689.
- Hamid, Amal. (2016). The effectiveness of flipped classrooms and blended classrooms in developing web page design skills for female students at the Islamic University of Gaza [Unpublished Master's Thesis]. Islamic University, College of Education, Palestine.
- Hassan, Muhammad. (2018). Designing a three-dimensional electronic learning environment based on collaborative group strategies to develop skills in using electronic networks among education technology students. Journal of Education, 2(177), 789-841.
- Hess, R, & Hagemeyer, N. E, & Blackwelder, R, & Rose, d, Ansari, N, & Branham (2016). Teaching Communication Skills to Medical and Pharmacy Students Through a Blended Learning Course, American Journal of Pharmaceutical Education ,80(4), pp. 1-10.
- Hilliard, T.A. (2015). Global Blended Learning Practices for Teaching and Learning, Leadership and Professional Development. Journal of International Education Research.
- Ibrahim, Hamada. (2018). The effectiveness of resource-based learning "individual-groups" in developing information skills among high school students and their attitudes towards using learning resource centers. Journal of Education, 750-823.

- 
- Ilknur, I. (2017). Perceptions of Turkish EFL Students on Online Language Learning Platforms and Blended Language Learning. *Journal of Education and Learning*, (6). 1. p113-121. EJ1120222.STRENGTHSCAPE, (2018): Specific Features of Blended Learning, <https://strengthscape.com/specific-features-of-blended-learning/>.
  - Ismail, Ayman Ahmed; Farhat, Taher Abdullah Ahmed; Omar, Abdul Aziz Talib Abdul Hamid. (2018). Standards for designing mobile e-learning environments to develop skills in programming educational web pages, *Egyptian Society for Educational Technology*, 3(28), 331-356.
  - Khalifa, Ali. (2016). Strategies of interactive virtual tours (individual-cooperative) online and their effect on developing concepts of information services among educational technology students and their willingness to use them, *Egyptian Society for Educational Technology*, 26(2), 107-177.
  - Khamis, Muhammad Atiyah. (2013). *Theory and educational research in educational technology*. Cairo, Dar Al-Sahab for Publishing and Distribution.
  - Khamis, Muhammad. (2015). *Sources of e-learning, vol. 1: Individuals and Media*. Cairo: Dar Al-Sahab for Publishing and Distribution.
  - Ramoud, Rabi Abdul Azim. (2013). The interaction between navigation styles (networked, hierarchical) in the e-learning environment and learning style and its effect on achievement and developing web page design skills among education students, *Egyptian Society for Educational Technology*, 3(23), 73-128.
  - Rashed, Muhammad. (2017). *Employing blended learning in designing educational websites*. Amman: Dar Safa for Publishing and Distribution.
  - Saeed, Saad. (2020). Two methods of providing guidance "image/video" in augmented reality and learning style "individual/group" on developing skills for producing three-dimensional shapes among graduate students. *Educational Journal*, 385-451.
  - Saleh, Huda. (2018). The effectiveness of blended learning in developing skills in artistic photography and attitudes towards the subject of art education among third-grade female students [Master's Thesis]. Qassim University.
  - Samhan, Manal. (2021). Requirements for transitioning to blended learning in pre-university education to face the challenges of Corona. *Journal of Educational Sciences*.
  - Samra, Emad; Al-Najjar, Muhammad. (2018). The impact of using some cooperative e-learning

---

strategies on developing cognitive achievement and skills in designing and producing e-courses among a sample of Umm Al-Qura University students and their innovative thinking, Arab Researches in Quality Education.

- Shaaban, Amani. (2018). Barriers to using blended learning in educational graduate studies at Cairo University. *Journal of Education*, 33(1).
- Shaheen, Fatima. (2020). Blended learning: its definitions, advantages, and models, *New Education*. <https://www.new-educ.com>.
- Subhi, Nasreen bint Hassan Ahmed. (2020). The reality of using technological innovations in developing self-learning among physics students at Umm Al-Qura University. *Arab Researches in Quality Education*, 7(19), 139-170.
- Teatch Staff. (2020). The Benefits of Blended Learning, February 2016 Updated on June 17, 2020, in *Technology*. <https://cse.google.com/cse?q=The+concept+of+blended+learning&sa=Search&ie=U>.
- Trapp, s. (2020). Blended Learning Concepts - a Short-Blended Learning Overview. <https://www.researchgate.net/publication/234659243> Blended Learning in Saudi Universities Challenges and Perspectives.
- Watson, J. (2009). Blended Learning: The Convergence of Online Yang, Yu-Fen (2012). Blended Learning for College Students with English Reading Difficulties. *Computer Assisted*.