

# Impact of Web-Based Training on Learning Outcomes: Gender Differences

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**Abstract:** *This study examines gender differences in a web-based training program by discovering the impact of using a web-based training program on trainees' learning outcomes. The researchers utilized a mixed-methods approach that consisted of an experimental study and qualitative data collection. The sample population of the experiment was composed of 25 female and 25 male participants. However, the qualitative data were gathered through interviews with 8 female and 8 males from these trainees. The study is based on 3 main hypotheses that address the differences between males' achievements on a pretest and posttest, females' achievements on a pretest and posttest, and both the male and female participants' learning outcomes in the web-based training program. The findings of the quantitative data indicate that there is no significant difference between the male and female participants' results on the pretests. However, the male participants' training outcomes in the posttest were higher than those of the female participants. In general, the researchers conclude that the variations in male and female participants' training outcomes may be a result of a fear of participation on the part of the female participants, in addition to the impact of technical problems that might have affected the trainees' performance and engagement in the program.*

**Keywords:** web-based training, learning outcomes, gender differences, learning outcomes, Instructional design

## 1. Introduction

Do students learn the same way? Can we help them overcome their academic challenges by following the same approach with each student? Generally, students' learning outcomes are affected by different factors, such as the manner and circumstances surrounding learning as well as each student's learning style (Cassidy, 2004). An effective way in which students learn is by solving real problems and collaborating with others. This means that students can be taught concepts, basic skills, and procedures through the implementation of instructional design models (Grabinger, Aplin, & Ponnappa-Brenner, 2007).

The term instructional design refers to "the systematic and reflective process of translating principles of learning and instructional materials, activities, information resources, and evaluation" (Smith & Ragan, 1999, p. 2). The term *instructional design* is also defined as "the complete process of analyzing what is to be taught, how it is to be taught, conducting tryout and assessing whether learners learn" (Husén & Postlethwaite, 1994, p. 28). Instructional design focuses on building an instructional environment and tools that facilitate learners' accomplishments of certain tasks (Broderick, 2001).

The main goal of instructional design is to enhance students' learning and success through using attractive and effective ways of presenting content while encouraging interaction (Chaudry & Fazal-ur-Rahman, 2010). Therefore, there are many aspects that should be considered in any design to arrive at the desired outcome. For example, good designs should not only focus on creativity and visual representation of activities, but also on engagement (Faryadi, 2007).

Some features are necessary to characterize an instructional design as effective. The creators should consider screen design and use attractive colors, animations, graphics, and texts to facilitate user navigation. Users can be encouraged

to participate by providing them with positive feedback. In addition, students should be provided with adequate control over course content, and they should be provided with content that suits their individual learning styles (Stempler as cited in Faryadi, 2007).

The term *web-based training* (WBT) is common in the training field as a consequence of technological improvements made over the last decades; in fact, there has been a significant increase in the use of the Internet to train employees, improve their performance, and positively influence the productivity of most organizations (Dobre, 2012). Specialists defined WBT as a new style of distance learning, and it has gradually become popular, especially in business environments (Piccoli, Ahmad, & Ives, 2001). According to Lau (1999), web-based "is perceived as a cheaper, faster, and more efficient way to train a large number of employees anywhere in the world" (p. 259). WBT depends on the delivery of content over the Internet and through the use of web browsers to a computer or any portable device, such as notebooks. During the last two decades, the number of integrated web-based training programs has increased, resulting in large numbers of employees being trained because these virtual classes are more flexible, cheaper, and more easily accessible than traditional classrooms (Dobre, 2012).

As a result of today's varying factors such as globalization of industry and increasing world trade, teaching and learning of diverse student groups has become a worldwide trend (Parrish & Linder-VanBerschoot, 2010). Thus, students need courses that can match their diverse cultural backgrounds. However, this does not mean that the instructional designers must design specific instructions for each culture; instead the designers must provide the students with content that can be contextualized according to each one's culture (Sims, 2006). This is achieved by examining differences of students in a classroom environment and providing each one with adequate instruction that enhance his or her motivation toward learning. In contrast, failure to adapt to these diverse

Volume 6 Issue 4, April 2017

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backgrounds may lead to lack of motivation and failure among students (Tomlinson & Kalbfleisch, 1998). Therefore, it is important to consider diversity of learners' social identities in any educational context, including distance learning (Higbee, Duranczyk, & Buturian, 2011).

### **Problem Statement**

Web-based instructional design has become a common trend, especially in training and teaching processes to diverse people from different cultures, languages, and interests who learn the same content together through a variety of technological tools. This study focuses on addressing the impact of diversity, especially gender differences, on a trainee's learning outcomes from web-based training programs. For instance, in the online learning environment, the self-efficacy and scores for women on final tests are higher than they are for men (Chyung, 2007), which could be a result of gender differences. Therefore, instructional designers need to consider the problem of gender diversity when creating web-based training programs.

### **Purpose Statement**

The purpose of this study is to examine whether learning outcomes from web-based training programs vary according to gender differences. These gender differences could appear in the frequency of material usage, the results of assessment tests, communication skills, levels of confidence, motivation toward the online training program, and other indicators (Young & McSparran, 2001). Thus, this paper focuses on the implementation of an experiment to discover the variations in gender achievement on tests as an examination of the impact of diversity in web-based training environments.

### **Significance of the Study**

Recently, in the Kingdom of Saudi Arabia, many web-based training programs have appeared that aim to improve individual development and increase organizational productivity. This paper might help trainers and business administrators to discover the impact of gender differences on web-based training programs and enable them to enhance these programs to create effective and creative tools and strategies to increase trainee engagement in these programs and improve learning outcomes (Khechine, Lakhil, Pascot, & Bytha, 2014). This study will also help to improve societal awareness of the importance and benefits of web-based training programs (Atack, 2003), despite the existence of some barriers in web-based training that may hinder some individuals' achievement.

## **2. Literature Review**

### **Designing a Web-Based Instructional Design Program**

The increasing interest in using the Internet for learning has influenced the profession of instructional design. Since 1995, using the Internet to deliver instruction has increased, which has led to an increase in the demand for distance learning programs (Bassi & Van Buren, 1999). These programs need to be designed according to instructions that can be incorporated into web-based courses (Gustafson & Branch, 1997). Web-based instruction has become a

common training option. In 2002, a report by the American Society for Training and Development indicated that organizations in the United States were utilizing technology to deliver 15% of their training programs. In addition, companies in Japan were delivering 20% of their training programs by integrating technology (Sugrue, 2003).

These web-based training programs offer appropriate training techniques for employees and provide them with the required skills and knowledge to do their jobs (DeRouin, Fritzsche, & Salas, 2004). Traditional or face-to-face classrooms depend on using a variety of models that facilitate the learning process. However, online education lacks models for optimizing the learning processes. Thus, the models of face-to-face classroom environments could not be integrated into online educational environments (Bartley & Golek, 2004).

A constructivist approach to learning has some features that can help to facilitate the process when institutions are integrating web-based learning courses. These features include meaning construction, supporting students' learning through social interaction, and problem solving (Hong, Lai, & Holton, 2001). Constructivist instructional design models (CIDMs) focus on facilitating the learning process instead of on predicting the learning outcomes (Nam & Smith-Jackson, 2007).

In addition to the constructivist approach, the objectivist instructional design models (OIDMs) focus on the conditions that are used to achieve the intended desired outcomes of learning. In learning, the last model also depends on both behaviorist and cognitive approaches (Tennyson, 2010). The behaviorists focus on the existence of the relationship between conditions of learning and learning outcomes, whereas the cognitive approach focuses on using advance organizers, mnemonic devices, and schemes of learners as a way of organizing knowledge (Ertmer & Newby, 2013). Using objectivist approaches can cause various problems, such as not focusing on designing the user interface (Nam & Smith-Jackson, 2007).

Moreover, there is a mixed approach to instructional design that suggests that instructional design models involve all theories of learning depending on the situation (Deubel, 2003). For instance, having different learners and a variety of learning environments requires implementing a variety of learning theories and, therefore, different models of instructional design. Unfortunately, this approach does not address the problem of designing a user interface and web-based learning (Nam & Smith-Jackson, 2007).

Also, many researchers referred to different instructional design models that can facilitate learning in web-based learning environments (Deubel, 2003). For example, Bartley and Golek (2004), in their study, indicated that the integration learning design in multimedia CD-ROM (ILDIC) model refers to the different required components of electronic pedagogy. Importantly, this model proposed that electronic learning pedagogy must include conventional pedagogy, the capability of planning and managing any event online, an online awareness (Petrushin & Dovgiallo, 1993), knowledge about current technology and possible

future ones, and the ability to use technology in training (Desrochers, House, & Puja, 2001).

Additionally, ACTIONS model can be used in assessing the effectiveness of technologies of learning such as online learning. This model identifies different aspects that need to be considered when implementing online training programs (Bartolic-Zlomislac & Bates, 1999), including “the access, costs, teaching and learning, interaction and user friendliness, organization, novelty and speed of the training intervention being developed” (Bates, 1995, p. 169). Moreover, many ideas have to be considered when integrating any online course: the efficiency in using online learning, classroom presentations, synchronous and asynchronous programs, the needs of individuals, the capability to access the material of the course, the ability to send and receive feedback, the tools of class management, and the tools for measuring the results (Taylor, 2002).

In general, a web-based learning value chain development in organizations that would include the following phases: preparing and assessing readiness of an organization, designing suitable content, designing suitable presentations, and integrating e-learning. This process can help justify training program expenses, and using these phases with accepted models, such as computer-based training (CBT), can lead to the design of an effective e-learning course (Wild, Griggs, & Downing, 2002).

Generally, learners can create their own meaning and understanding of the world around them depending on their experiences. Individuals have unique mental abilities such as problem solving and critical thinking that help them to make meaning from their own experiences (Von Glasersfeld, 1989). Therefore, instructors can support learners and enhance their ability to understand a certain content by setting up different types of learning activities, whether web-based activities or off-line ones. Thus, each learner would select the most appropriate activities for his or her learning style (Hong et al., 2001). By using the verity of online tools, trainees can specify their learning styles and then select the most appropriate ways to acquire knowledge while they are learning (Dzakiria, Abdul Razak, & Mohamed , 2004). In addition, online courses, by their nature, do not provide an adequate social environment, so the trainees might feel isolated from society. Thus, the content of online courses must be designed based on a model of learner-centered approaches so that the users or learners can achieve their goals (Kilby, 2001). Moreover, educators should focus on the ways that trainees learn through technology, instead of only focusing on the types of media. Thus, trainees’ learning styles need to be considered when designing any online course (Guy & Lownes-Jackson , 2012).

### **The Impact of Web-Based Instructional Design**

Students’ negative perceptions regarding web-based learning are based on their belief that this type of learning requires more hard work than traditional classes do (Sweeney, O’Donoghue, & Whitehead, 2004). Additionally, although online training is popular in many organizations, some individuals might still have negative perceptions regarding the effectiveness of these courses in meeting trainees’ needs

(Kilby, 2001). However, different studies have proven that students’ perceptions of web-based instruction can vary (Turpen, Finkelstein, & Pollock, 2009). Many students believe that web-based instruction can serve more students and reduce the barriers that exist between users, such as gender, race, and ability differences (Wang, Lin, & Sun, 2007). More importantly, online training can positively affect the learning and performance of employees in any organization. Trainees’ perceptions regarding web-based instruction might be modified by examining the real-life impact of this type of training (Kilby, 2001).

The media, including video, computers, and other technologies, are tools that are used to deliver instruction, and they could not affect learners’ performance if they were not designed to effectively enhance the learning process and match the needs of the learners (Guy & Lownes-Jackson , 2012). Therefore, web-based instruction can offer many advantages and benefits for learners or trainees if matching the learners’ needs is the main goal (Ray, 2010). This type of training can be updated, so it offers the feature of adding more instructors or students. The learners can collaborate to solve real-world problems, and the trainers can deliver training programs in effective ways that expand the organization’s practices (DeRouin, Fritzsche, & Salas, 2005). Evans and Haase (2001) indicated that there are different possible benefits for online learning and training within companies. Some of these benefits include the reduction of employees’ travel costs and saving time, training more employees, and increasing the frequency of the courses.

Online training courses provide learners with opportunities to complete required technical, work training, or certification programs (Bates, 1995). It increases individuals’ abilities and knowledge and facilitates learning processes (Aragon, 2003), besides reducing the financial costs and lost time of the trainees (Bates, 1995). Importantly, web-based instruction can raise the accessibility of training and improve the capabilities of human capital (Sitzmann, Wisher, Stewart, & Kraiger, 2005). In schools, students who used web-based tutorials achieved higher scores on exams than students who learned the same content in traditional classrooms (Desrochers et al., 2001). For instance, integrated web-based instruction had a positive impact on students’ performance in English paragraph writing, whereas students who attended face-to-face classrooms had lower academic performance (Woottipong, 2013). Web-based instructional design offers reinforcement statements, explanations, and feedback, which positively affect learners’ academic achievement (Guy & Lownes-Jackson, 2012).

Web-based education may also help to minimize students’ academic challenges. Conversely, some studies indicate that students who use printed course materials achieved higher scores than students who relied on web-based content (Guy & Lownes-Jackson , 2012). Other studies show that available web-based instructional tools are ineffective in improving students’ academic performance, compared with instruction involving actual communication with instructors (Elicker, O’Malle, & Williams, 2008). Importantly, in evaluating the effectiveness of the web-based instructional

design, the designers need to consider assessing the trainees' needs, rather than comparing the course's outcomes to face-to-face courses because the main goal of any learning program is to meet the needs of learners, not compare their achievement to others in a different environment (Vrasidas & McIsaac, 2000).

### Diversity and Web-Based Instructional Design

The existence of variety of cultures and cross-cultural trainees lead to the integration of web-based instruction, which positively influences socioeconomic opportunities in improving nations. Some individuals are afraid of using anything new; therefore, they might not believe in the effectiveness of using web-based instruction in education or training courses (Olaniran, Rodriguez, & Williams, 2010). Thus, educators or instructional designers should perceive and consider the possible factors that influence the effectiveness of web-based instruction, including gender differences, cultures, and personal preferences (Koc, 2005). Moreover, individuals' cultural background affects their perception of web-based instruction. For instance, Anglo-Saxon learners were more confident in dealing with web-based instruction, although both the Anglo-Saxon and Asian learners believed that web-based instruction is a creative idea and can facilitate learning (Bauer, Chin, & Chang, 2000). Web-based instruction designers should consider all possible factors, not just cognitive factors that affect the performance of learners in web-based learning environments, including motivation, gender, age, and level of frustration (Wang et al., 2007). Web-based instruction designers should also offer a variety of strategies and learning tools that can match all learners' interests and preferences and increase their motivation (Koc, 2005). Men and women's performance may vary when using web-based learning programs as a result of the differences in their real-life roles and responsibilities (Yukselturk & Bulut, 2009).

Importantly, there are no significant differences between the genders in achievement regarding use of web-based training programs (Chen & Macredie, 2010). The variety of the differences in the behavior of male and female learners when using web-based instruction include the fact that women present a higher rate of test anxiety when compared to men (Wyrostek & Haefner, 2011). In addition, men's self-efficacy and task value were higher than women's in using web-based training programs (Yukselturk & Bulut, 2009). Gender differences also include variation between male and female confidence in their ability to successfully use technology and support systems in technological environments. Women also presented various negative attitudes toward web-based training programs, including talking less, participating less frequently, and receiving less positive results than their male counterparts (Barrett & Lally, 1999). Other variations between men and women in the web-based learning environment include the levels of motivation, flexibility, and access in using web-based instructions (Wang & Lin, 2007). Men are likely to be more confident and enjoy utilizing web-based materials; women are more likely to be anxious about using web-based instruction and about their ability to handle technological tools (Gunn, McSporrán, Macleod, & French, 2003).

Differences between the genders exist in web-based instruction as well as in traditional learning environments. These differences could be the result of social relationships, inequities, and learning styles (Piccoli et al., 2001). Therefore, any instructional designer needs to consider these differences and provide both genders with appropriate instructions to help them overcome any barriers in the learning environment (Koc, 2005).

This paper fills a gap in the literature regarding the examination of the effectiveness of web-based training programs in Saudi Arabia. There is a lack of studies that address the variation of male and female learning outcomes in learning environments in Saudi Arabia. Thus, this study highlights the differences between Saudi genders regarding their learning outcomes.

### 3. Research Questions

- 1) Is there a significant difference between males' achievements on a pretest and a posttest in web-based training programs?
- 2) Is there a significant difference between females' achievements on a pretest and a posttest in web-based training programs?
- 3) Are the learning outcomes of trainees in web-based training programs affected by gender differences?

#### Hypotheses

- H<sub>1</sub>: there is a significant difference between males' achievements on a pretest and a posttest in web-based training programs.  
H<sub>0</sub>: there is no significant difference between males' achievements on a pretest and a posttest in web-based training programs.  
H<sub>2</sub>: There is a significant difference between females' achievements on a pretest and a posttest in web-based training programs.  
H<sub>0</sub>: There is no significant difference between females' achievements on a pretest and a posttest in web-based training programs.  
H<sub>3</sub>: Trainees learning outcomes from web-based training programs are affected by gender differences.  
H<sub>0</sub>: Trainees learning outcomes from web-based training programs are not affected by gender differences.

### 4. Methodology

#### 4.1 Research Design

This paper follows a mixed-method research design, using experimental and qualitative approaches while presenting different points of view in the literature. The researchers followed a systematic approach in reviewing the literature, which includes three sections: (a) designing web-based instructional design programs, (b) the impact of web-based instructional design, and (c) diversity and web-based instructional design.

The researchers used an experiment in this study because variations between men and women can be discovered through experimentation. For instance, Yukselturk and Bulut (2009) conducted an experiment to examine gender

differences in a self-regulated learning environment. They also examined the role of motivational beliefs on enhancing gender learning in online learning environments. The sample consisted of 145 learners from an online course that depends on both synchronous and asynchronous communication tools on the Internet.

The researchers used the Motivated Strategies for Learning Questionnaire (MSLQ) to assess learners' motivation and learning strategies. The findings of their study indicate that there is a variation between females and males in online learning environment (Yukselturk& Bulut, 2009). Following Yukselturk and Bulut's experiment which is valid and reliable, the author of this study adapted an experimental approach to investigate the impact of gender on learning outcomes in web-based training programs in the eastern province of Saudi Arabia.

#### 4.2 Participants

This experimental approach included two groups of trainees, 25 males and 25 females, to measure the impact of gender differences on training outcomes from a web-based training program. The samples for this study were conveniently selected based on the researchers' location and ability to obtain access to conduct the study and collect data.

#### 4.3 Procedures

The web-based training program included a learning environment with a trainer, visual aid, and chat box to facilitate interactions with the trainer and between the trainees themselves. The four-hour program focused on improving the trainees' personal quality, especially at the workplace. The researchers used pre- and post-testing to assess the trainees' knowledge of interpersonal skills; these questions were focused and addressed the main objective of the course. Both male and female trainees were given enough time to answer 10 questions. At the end of the program, the trainees received the posttest, which had the same questions as the pretest, to assess their understanding and knowledge of the content, permitting the researchers to discover clear results about gender variations in web-based training programs.

This experiment measured the trainees' learning outcomes, which is a dependent variable, and how they could be affected by their gender, which is the independent variable. In addition, the researchers examined whether there was a significant difference between males' and females' achievements on a pre- and post-test in web-based training programs.

A qualitative approach was used to inform the results of the experiment, which involved conducting interviews with eight male and eight female users of web-based training programs. The interview questions focused on three areas: whether participants faced any difficulties while attending the web-based training programs and whether there were advantages and disadvantages in the experience; whether the participants' culture enhanced or hindered their engagement in the course; and whether their experiences in web-based training programs possibly impacted their jobs.

#### Data Analysis

To analyze the data in the study, t-test Paired Samples Statistics and Independent Samples Test were used to test the research hypotheses. First, the researchers used Paired Samples Statistics to examine the existence of differences between the pretest and posttest separately for both males and females. The results of the analysis of the males' pretest and posttest are presented in Tables 1, 2, and 3 as follows:

The male mean pre-test score equaled 4.44, and the male mean post-test score equaled 8.80. The analysis results also indicated the value of the probability, which was  $t(24) = 12.97$ , probability value ( $p$ ) = .0, which was less than 0.05. The paired samples test also referred to the difference between the mean of the pre-tests and post-tests of males, which was 4.360.

**Table 1: Paired Samples Statistics- Male**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	4.44	25	1.530	.306
	Posttest	8.80	25	1.041	.208

Note. The table presents the difference between the mean of both pretest and posttest of males.

**Table 2: Paired Samples Correlations - Male**

		N	Correlation	Sig.
Pair 1	Pretest & posttest	25	.188	.367

**Table 3: Paired Samples Test- Male**

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair1	Pretest - posttest	4.360	1.680	.336	5.054	3.666	12.974	24	.000

Note. The table presents that the significant difference between the mean of both pretest and posttest of males is < 0.05

Paired Samples Statistics were also used to examine the existence of differences between the pretest and posttests for females. The results of the analysis of the females' pretest and posttest are presented in Tables 4, 5, and 6 as follows:

The female mean pre-test score equaled 3.76, and the female mean post-test score equaled 6.52. The analysis results also

indicated the value of the probability, which was  $t(24) = 11.5$ , probability value ( $p$ ) = .0, which was less than 0.05. The paired samples test also referred to the difference between the mean of the pre-tests and post-tests of female, which was 2.760.

**Table 4: Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	3.76	25	1.715	.343
	Posttest	6.52	25	1.610	.322

*Note.* The table presents the difference between the mean of both pretest and posttest of females.

**Table 5: Paired Samples Correlations- Female**

		N	Correlation	Sig.
Pair 1	Pretest & posttest	25	.741	.000

**Table 6: Paired Samples Test**

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Pretest -posttest	2.760	1.200	.240	3.255	2.265	11.500	24	.000

*Note.* The table presents that the significant difference between the mean of both pretest and posttest of females is  $< 0.05$

Third, the researchers used the Independent Samples Test to compare the male and female pretest and posttest results. The results were presented in both Table 7 and Table 8 and indicate the following:

The mean difference in the pre-test between males and females was .680; however, the mean difference in the post-

test between males and females was 2.280. As Table 8 presented for the pre-test,  $t(47.388)$  was equal to .146, and the probability value ( $p$ ) = .146, which was greater than 0.05. The table also presented the details of the post-test, which included the values of  $t(41)$ , which was equal to 5.945, probability value ( $p$ ) = .0, which was less than 0.05.

**Table 7**

*Note.* The table presents the mean differences in the pre-test and post-test between males and females.

<i>Group Statistics for both male and female in pretest and posttest</i>					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Male	25	4.44	1.530	.306
	Female	25	3.76	1.715	.343
Posttest	Male	25	8.80	1.041	.208
	Female	25	6.52	1.610	.322

**Table 8: Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pretest	Equal variances assumed	.003	.957	1.480	48	.145	.680	.460	.244	1.604
	Equal variances not assumed			1.480	47.388	.146	.680	.460	.244	1.604
Posttest	Equal variances assumed	3.613	.063	5.945	48	.000	2.280	.383	1.509	3.051
	Equal variances not assumed			5.945	41.072	.000	2.280	.383	1.506	3.054

*Note.* For the pre-test ( $p$ ) > 0.05, and ( $p$ ) = 0 for the post-test.

### Interview Analysis

The researchers collected qualitative data from eight male and eight female participants who attended the web-based training program. Descriptive Thematic Analysis was utilized to examine the interviewees' answers. The researchers established a certain pattern for the answers and classified these answers into different themes.

### Advantages and Disadvantages of Web-Based Training Programs

When the trainees were asked about their experience in this course and whether they faced any difficulties, all of them agreed that network issues and technical issues with Java were obstacles that led them to seek support so they could attend the course. One of the female trainees noted that

“some trainees prefer actual courses as a result of the weakness of communication with the trainer in web-based training courses” (FP<sub>1</sub>). Moreover, four of the female participants (50 %) and all of the male participants (100 %) asserted that the online training programs are less expensive than in-class training programs. However, one of the female trainees stated that “the credit degree for online courses is not equal to that of in-class courses, especially in public sectors; thus, the price of online courses should be more acceptable” (FP<sub>2</sub>). Additionally, all interviewees asserted that the flexibility in time is the main advantage of web-based training programs, as is the flexibility of location. Also, three of the female (37.5 %) and six of the male (75 %) participants stated that the online course enhanced their understanding of the course content through the use of

audio, video, text, and visual aids, which motivated them to participate and engage in the discussion during the course, thus suiting all of the trainees' learning styles. One of the male participants stated that the "web-based training program is more practical and protects trainees' time; it also caters to all individuals' circumstances, including individuals with disabilities" (MP<sub>1</sub>).

### Gender Differences in Web-Based Training Programs

The researchers examined the impact of the trainees' cultures on the enhancement of or hindrance to their engagement in the course. All of the participants believed that, in general, Saudi culture has changed and has become more open to new trends and ideas, including the use of web-based training programs. However, they stated that there are some individuals who still prefer training among their gender. Additionally, five of the female participants (62.5 %) indicated a similar point, which is that they are naturally more shy, more hesitant, and more fearful of new environments than men, which might hinder their engagement in web-based training programs. One of the female participants stated that "during the course time when the trainer asked questions, I wished I could participate and use the microphone to express my opinion, but I was afraid of this new experience, especially with males attending" (FP<sub>3</sub>). All of the female participants stated that they preferred to add their input and contributions through using the chat function rather than the microphone; however, the males did not have any problems related to using the microphone or chat function. Moreover, five of the female participants (62.5 %) asserted that their responsibilities, especially during the evening with their children, might lead them to avoid engaging in such courses. All the participants agreed that despite the gender differences, either psychologically or in regard to responsibilities, both genders can pursue an education despite some existing challenges.

### Web-Based Training Programs for Employees

The researchers then asked the individuals about their experiences in web-based training programs and the possible impact on their jobs. All the participants asserted that these courses could help them engage in individual development and provide them with the appropriate skills to perform their work tasks adequately. Five of the participants (32 %) emphasized the importance of the course content and the trainer's skills to meet the employees' needs. One of the female trainees stated that "web-based training programs can increase the productivity of organizations because the employees can participate in on-job training programs so that they fulfill their work responsibilities and learn at the same time" (FP<sub>4</sub>). In addition, the participants agreed that these training programs could decrease the organizations' expenditures on employee training. Furthermore, one of the male participants stated that "web-based training programs can provide organizations around the world with many opportunities to train their employees in courses that teach them skills and competence" (MP<sub>2</sub>). Additionally, five female participants (62.5%) indicated that in some professional fields, the in-class training programs could be more useful than web-based course implementation because employees in certain fields need to communicate and

practice what they learn in an actual environment rather than a virtual environment. Furthermore, one of the male participants stated that "in-class training programs can provide trainees with a sense of seriousness so that they can be more disciplined in attending and participating and benefit by improving their job performance" (MP<sub>3</sub>).

## 5. Discussion

The results of the Paired Samples Statistics that investigated the existence of differences between the results of the pretest and the posttest for males and females point to a variety of important conclusions related to web-based instructions. To examine the first null hypothesis, that there is no significant difference between males' achievements on a pretest and a posttest in a web-based training environment, Paired Samples Statistics were used, as shown in Tables 1, 2, and 3. Because the value of the probability ( $p$ ) is equal to zero, less than  $\alpha$  at 0.05, a significant difference between males' results in pretests and posttests does exist. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted, indicating males' achievements in pretests are not equal to their achievements in posttests. By comparing the mean of the pretest for males, which is 4.44, to the mean of the posttest for males, which is 8.80, it was obvious there was a positive change in male training outcomes after attending a web-based training environment.

To test the second null hypothesis, that the pretest and posttest are not directly related to a female's learning outcomes, the results presented in Table 4, 5, and 6 were examined. As Table 4 presents the value of the probability ( $p$ ) is equal to zero, meaning less than  $\alpha$  at 0.05, it is proven that there is a significant difference in female training outcomes between pretests and posttests. In posttests, females perform better, indicating the effectiveness of the web-based training environment in raising female trainees' learning outcomes.

The third hypothesis is that gender differences are directly related to the trainees' training outcomes in a web-based training environment. As Table 7 presents, in the pretest there is a small difference between both male and female results. That difference can be attributed to male trainees having prior knowledge about the information being tested; thus, they achieved little progress ( $M=4.44$ ) compared to females ( $M=3.76$ ). After examining the results in Table 8, it is clear that there is no significant difference between males' and females' achievements in pretests because the value of the probability is more than the value of  $\alpha$ . However, there is a significant difference between male and female training outcomes in posttests as the males performed better than the females because the value of the probability is less than  $\alpha$ . Thus, the null hypothesis is rejected and the alternative hypothesis is accepted, meaning that trainees' training outcomes can be affected by gender differences. Through this investigation, gender was found to have an effect on training outcomes in web-based training environments. Therefore, it is important to examine the size of that effect through calculating Cohen's  $d$  as the following:

$$\begin{aligned} \text{Cohen's } d &= \text{mean}_1 - \text{mean}_2 / s \\ s &= \sqrt{[(n-1)s_1^2 + (n-1)s_2^2] / (n_1 + n_2 - 2)} \\ s &= \sqrt{24(1.0836) + 24(2.5921)} / 48 \\ s &= 1.355 \\ \text{Cohen's } d &= 8.80 - 6.52 / 1.355 \\ \text{Cohen's } d &= 1.68 \end{aligned}$$

Because the value of Cohen's  $d > .08$ , there is a large effect size of gender on the trainees' training outcomes, confirming that males perform better than females in a web-based training environment. Similarly, Chyung (2007) concluded in his study that there is a difference in gender performance in web-based learning environments, but he found that females perform better than males. Moreover, both of Yukselturk and Bulut (2009) in their study concluded that males and females perform differently in online environments, and males display a significant difference in their achievement (Yukselturk & Bulut, 2009). Through analyzing the qualitative data, the researcher found that participants believe in the importance of web-based training programs, especially in the workplace. However, the researchers found that there is some variation among men's and women's answers regarding engagement during the course. The female participants showed some fear and hesitation in regard to engaging in discussions or expressing their thoughts, which is in contrast to the male participants, who did not express any problems with engagement. Importantly, all of the participants agreed that technical and Internet problems were obstacles that could affect any trainee's engagement in web-based training programs. Therefore, the variation among the male and female participants' results in the pretest and posttest may be affected by these challenges, including shyness, hesitation, or fear on the part of the female participants, as well as the technical problems, especially due to the fact that both of the tests were designed to be taken electronically. Through the analysis of both research designs, quantitative and qualitative, it was found that both types of data informed each other. Despite the importance and benefits of web-based training programs, there are various obstacles that might hinder some individuals' learning outcomes in this environment, including individuals' responsibilities and skills.

## 6. Conclusion

Gender differences in web-based training environments were investigated in this study by following a mixed-method research approach consisting of experimental groups and quantitative methods. A few essential questions were addressed in this paper that relate to the variations between a trainee's achievements in a pretest and a posttest, and the effect of gender differences in a web-based training environment. The results of the experiment and the interviews led to the conclusion that in a web-based training environment, males' and females' training outcomes are different, and men perform better than women. The difference in training outcomes is a result of the impact of web-based instructions, regardless of the trainee's prior knowledge, because the pretest showed there was no significant difference between males' and females' knowledge of the topic prior to the web-based training.

Importantly, the gender of the learners can affect their engagement in an online learning environment because men and women have different types of learning styles (Wyrostek & Haefner, 2011). However, females might experience some difficulties or challenges in web-based instruction, including cultural impacts that might hinder their performance. Thus, web-based instructions should be designed to fit all learners' cultures and learning styles (Liu, Liu, Lee, & Magjuka, 2010).

## 7. Limitations

The main limitation of this study is that the trainer was a female, and for cultural reasons, she used her voice-over instead of a video while presenting the course content, visual aids, videos, and discussions. Some learners might prefer to watch the trainers face. In a 2015 study, Kizilcec, Bailenson, and Gomez conducted an experiment meant to assess the impact of using video instruction for online learners, which means presenting the instructor's face while teaching. The study had several notable results, including revealing that the majority of students preferred to attend lectures in which they watched the instructor's face on video. However, there was no difference in learning outcomes between those who watched a video lecture and those who used only an audio lecture. More important, the researchers emphasized the impact of students' preferences for using an educational tool such as video on their cognitive load. They suggested that students' learning styles must be considered in any learning environment because some students might prefer using video and others might prefer using audio lectures to avoid any visual distractions. Thus, one can conclude that using video lectures may cater to the preferences and interests of a majority of learners in a way that positively influences their cognitive load (Kizilcec, Bailenson, & Gomez, 2015). In addition, this study suffers from one essential limitation, which is that both the pretest and posttest were designed by the program's trainer, so the validity and reliability of the test could not be measured. Moreover, the trainees were selected randomly, regardless of their skills in computers, and both the pretest and the posttest were conducted online, so some trainees might have faced some difficulty being tested in this way.

## 8. Recommendations

Further studies are recommended to examine the impact of culture on gender training outcomes because in Saudi Arabia, both males and females were studied in segregated environments. Males and females being trained together and learning side-by-side in a virtual learning environment might affect the outcomes based on the culture and prior experience of the trainees. For instance, this study found that females perform worse than males, and this variation in performance might be a result of lacking experience in learning in an integrated environment.

It is also recommended that further studies should address the motivational factors that lead the trainees to engage in online web-based training programs and whether these factors vary according to gender differences. It would be helpful to examine how certain learning activities, such as collaborative learning in web-based training environments,

enhance trainees' learning outcomes and to what extent trainees, both male and female, benefit from these activities. This can be determined by assessing their performance after each activity. An examination of whether learning activities in web-based training environments can narrow the achievement gap between males and females would be an additional benefit.

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