

# Service Quality as a Mediator between Interactivity, Simulation and Students' Satisfaction

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## *Abstract*

*This research aims at evaluating the current services provided in the training courses of maritime transport department, college of Maritime Transport and Technology, Arab Academy for Science, Technology and Maritime Transport (AASTMT). Also, the paper attempts to test the impact of Interactivity in training and Simulation-Based Services provided on the Students' satisfaction. In addition, the mediation impact of perceived quality between both; Interactivity and Simulation-Based Services on one side and students' satisfaction on the other side is investigated. Results shows a significant impact of both; Interactivity and Simulation-Based services on Students' Satisfaction. Finally, it is shown that there is a partial mediation of perceived quality between Interactivity, Simulation-Based Services and students' satisfaction.*

**Keywords:** Training Quality, Perceived Quality, Education Training, Students' Satisfaction.

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## **1. Introduction**

The education sector is playing an increasingly important role in developing the manpower and the economy of countries. Thus, there is an increasing interest in student satisfaction globally and a number of studies have investigated student satisfaction with a variety of focuses. The need to recruit and retain students has become highly important in recent years. By identifying the role of service quality, interactivity and simulation which lead to student satisfaction, universities will be more successful in both attracting and retaining students. However, strategies developed from those factors must also enhance teaching and learning to be able to increase student satisfaction. This raises a complex range of issues in higher education as the need to balance student expectations around teaching with the imperative for providing high-quality learning outcomes in consumer-driven societies poses many challenges (Poon and Brownlow, 2015).

The factors of service quality, interactivity and simulation that may lead to students' satisfaction are discussed below as they are considered as the one affecting students satisfaction. As a maritime transport department, it is highly concerned with practical work rather than training which is not based on simulation to reach an excellent level of facing challenges that seafarers may be exposed to while they are at sea. The researcher will study training courses quality with a focus on the technical parts that students are highly concerned with. These parts are defined through a pilot study as Interactivity and Simulation-Based Services. The following sections will study students' satisfaction in details as well as factors that are supposed to impact students' satisfaction in the maritime field.

### ***1.1 Students' Satisfaction***

Customer satisfaction is defined as the attitude resulting from what customers believe should happen (expectations) compared to what they believe did happen (performance perception) (Kuo et al., 2009). Satisfaction reinforces quality perception and drives students' enrollment. It is generally accepted that customer satisfaction is the product of some type of evaluation

process by the customer. It was observed that more recently researchers have viewed customer satisfaction as a summary of emotional and cognitive responses that pertain to a particular focus (such as expectations or actual experiences), which occur after consumption or after accumulative experiences (Clemes et al., 2011).

Satisfaction can be measured as an overall feeling or as satisfaction with the elements of a transaction (Chen and Tsai, 2007). Student satisfaction is defined as “*the favorability of a student’s subjective evaluation of the various outcomes and experiences associated with education. Student satisfaction is being shaped continually by repeated experiences in campus life*” (Annamdevula et al, 2016).

In the context of higher education, students are regarded as the primary customers. It was argued that student satisfaction is a short-term attitude based on an evaluation of their experience with the education service supplied supply of teaching/learning materials. Student satisfaction is not determined solely by the students’ teaching and learning experiences but rather by their overall experiences as a customer of a particular institution (Wilkins and Stephen, 2013).

### ***1.2 Perceived Quality***

Perceived service quality is the result of comparing expectations and perceptions (Ali et al., 2016). It has been rightly pointed out that analyzing students’ perceptions of service quality with a marketing approach may assist in attracting and retaining students (Ali et al., 2016).

The American Society for Quality defines quality as the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs (Yilmaz et al., 2010). Such definition was then developed in several ways; one of which is that service quality is the total evaluation of an organization providing a certain service, where the evaluation is the result of the comparison between the organization’s actual performance and the customer’s general expectations of how the organization was supposed to be performing (Deng et al., 2010).

Applied to the context of higher education, service quality was defined as “the difference between what a student expects to receive and his/her perceptions of actual delivery” (Carroll and Birch, 2013). It was pointed out that students’ perceived service quality is an antecedent to student satisfaction. The academic literature postulates that positive perceptions of service quality can result in student satisfaction and satisfied students may help attract new students through engaging in positive word-of-mouth (WOM) communication and may return themselves to the university to take further courses (Strayhorn, 2008).

### ***1.3 Interactivity***

Interaction among peers is vital in any learning program. Collaboration is an important part in most of the innovative courses delivered. Groups of learners interact and develop the attributes of a ‘virtual learning community’ even though they may never meet in the same place or same time. Collaboration was defined as the process of shared creation of two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have come to on their own. Besides having group discussions with their peers, students need to interact with their tutors to seek clarifications on any issues pertaining to their lessons and also to ensure that they are progressing in the ‘correct path’. It had been highlighted that importance should be given to student and instructor interaction which affects how well student learn. one of the components of a

successful online introductory statistics course is student-professor interaction (Saminathan and Goolamally, 2013).

Researchers found that if students actively engage in discussing with their peers, they will gain a lot of benefits (Orawiwatnakul and Wichadee, 2016). In general, e-learning is often chosen to give learners flexibility and control over the content and schedule of training. Providing learners with control over the training program affects how they interact with and perceive the training content (Karim & Behrend, 2015).

#### ***1.4 Simulation-Based Services***

Educational programs are rapidly changing which require a good understanding of such changes to be able to make decisions on how best to meet these changes (Dörnyei & Ushioda, 2013). Accordingly, Simulation Based Learning is considered as a major power of problem based learning. Key applications for simulation, such as training, decision support, procedure and mission planning will continue to be paramount for industry and will increase competency of seafarers. Real life training using real equipment presents a number of challenges. Increased risk to personnel and equipment combined with limited access to required marine assets and related escalating costs is creating increased demand for simulation technology (Panayides, 2006).

Simulation under highly realistic circumstances presents a safer and more cost-efficient training alternative. Simulation has already proven its effectiveness and is, without doubt, the future of maritime training. Due to the almost unlimited possibilities provided by simulation, better results can be achieved in a safer, more efficient manner, which in turn produces higher quality personnel (Sibert, et al., 2012).

## ***2. Literature Review***

Student satisfaction level has become a major focus of researchers in the competitive learning environment owing to its strong impact on the success of educational institutes and prospective student registration since the past few decades. Plentiful research available provided different conceptualizations and arguments on what the student satisfaction level is and how is it measured by universally accepted models (Weerasinghe and Fernando, 2017).

In the context of higher education, the concept of regarding students as customers of higher education service providers is not a new idea. Various researchers have suggested that students are primary customers and partners in the higher education sector as they consciously choose and buy services. According to Sapri et al. (2009), student satisfaction plays an important role in determining the accuracy and authenticity of the services being provided. This was further supported by Barnett (2011) who stated that satisfaction of students is important as it is the only performance indicator of service quality for service providers of higher education. Moreover, student satisfaction is a short-term attitude which results from their experience with the education services received (Sultan and Wong, 2013).

There are many ways to explain the facets of student satisfaction. As an example, Kaldenberg et al., (1998) looked at factors such as coursework quality, non-curriculum events and other university-related factors as determinants of student satisfaction. Moreover, Appleton-Knapp and Krentler (2006) divided factors influencing student satisfaction into institutional factors and personal factors. Institutional factors included quality of instruction, quality and promptness of the instructor's feedback as well as the clarity of his/her expectations, the teaching style of the instructor, the research emphasis of the institute and the size of classes.

Personal factors that were found to be predictors of student satisfaction were age, gender, employment, temperament, preferred learning styles and students' average grade point. Therefore, in order to ensure students are satisfied, higher education service providers have to consider both institutional and personal factors (Chahal and Devi, 2013).

Students' satisfaction is achieved when real performance of educational services exceeds student expectations. Student expectations are student expectations of the quality of services provided by educational services while performance is the real performance of the service quality provided by educational services. The main predictors of student satisfaction with educational services are performance of faculty, staff and classes (Andrew and Leonard, 2011).

The above definitions mentioned means that students satisfaction is related to the perceived service quality by students regarding the educational process. Thus, it depends on their experience to consider a certain university rather than another. Therefore, this research studies the relationship between service quality and students' satisfaction, as well as the relationship between Interactivity and students' satisfaction. Service quality in the field of higher education is particularly essential and important. It is an established fact that positive perceptions of service quality have a significant influence on student satisfaction. Satisfaction can be viewed as a state felt by a person who has experienced performance or an outcome that fulfills his or her expectation. Both quality and quantity of interaction with the instructor and peers are crucial to the success of courses and student satisfaction. Similarly, students' perception of interaction is the critical predictor of satisfaction in a course. On the other hand, social presence is a strong predictor of satisfaction (Weerasinghe and Fernando, 2017).

In general, this research aims at investigating the importance of such factors in the satisfaction of trainees in the Arab Academy for Science, Technology and Maritime Transport (AASTMT). This study will apply some statistical tools to figure out the important factors affecting students' satisfaction. Finally, a discussion of the results and findings will be provided with recommendations for further research.

### **3. Research Framework**

A survey is done through a questionnaire provided to student of Maritime Transport Department of AASTMT. The questionnaire included four main parts; Satisfaction, Training quality, Simulation-Based Services and interactivity. All questionnaires were delivered in person by the researcher to the students in training class in the period of the study. Questionnaire is provided to 600 students in the period of the study from September to December, 2017, where 532 respondents are only considered in the study after excluding questionnaires with missing responses.

In the questionnaire assigned, the questions were adopted to measure the dimensions under study by implementing a 5-point Likert -scale used for all responses with (1 = weak, 2 = average, 3 = good, 4 = very good, 5 = excellent). Thus, the literature had been reviewed and the following hypotheses were raised for testing:

H<sub>1</sub>: Interactivity significantly affects students' satisfaction in maritime transport training.

H<sub>2</sub>: Simulation-Based Services significantly affect students' satisfaction in maritime transport training.

H<sub>3</sub>: Perceived Training Quality significantly affects satisfaction in maritime transport

training.

H<sub>4</sub>: Perceived Training Quality significantly mediates the relation between Interactivity and Students' Satisfaction.

H<sub>5</sub>: Perceived Training Quality significantly mediates the relation between Simulation-Based Services and Students' Satisfaction.

Accordingly, the research framework could be presented using the following figure:

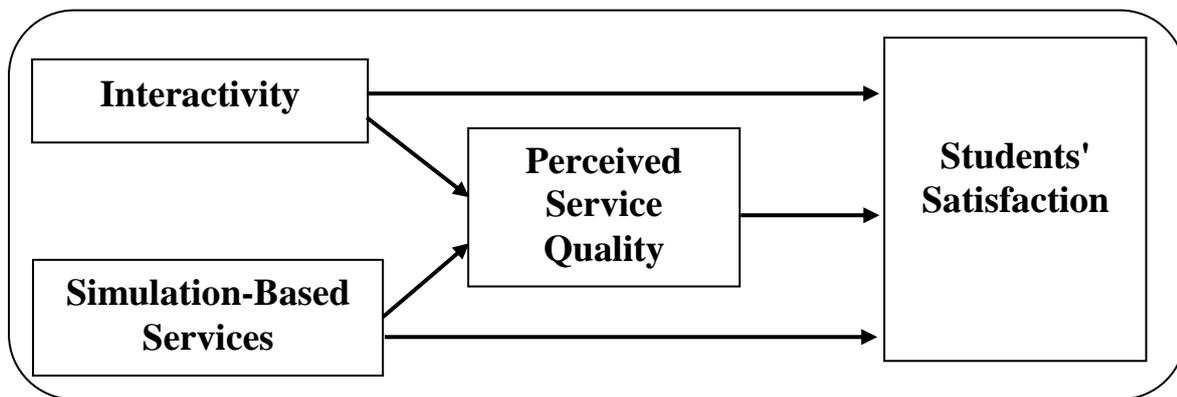


Figure (1): Research Conceptual Diagram for the Current Study

## 4. Data Analysis and Results

To test the hypotheses mentioned above, the current research used regression analysis. This requires testing the validity and reliability of the research variables as well as presenting a descriptive analysis of the research variables under study. After that, the researcher will present the hypotheses testing through the model constructed using regression analysis.

### 4.1. Descriptive Analysis

Table (1) provides the frequency table for the research variables, where it could be found that none of the students in the sample under study see the training quality, Interactivity, Simulation-Based Services as weak. Also, relatively larger percentage of the sample are ranked between excellent and very good (around 76%). Yet, there is a valid percentage of the sample under study who could see that the dimensions under study are ranked between average and good (around 22%).

Table (1) Frequency Table for Research Variables

Variable	Mean	St. Dev.	Frequency					Total
			Excellent	V. Good	Good	Average	Weak	
Training Quality	4.124	0.891	162	243	116	11	0	532
Interactivity	4.321	0.987	202	223	99	8	0	532
Simulation-Based Services	4.056	0.888	287	209	45	0	0	532
Students' Satisfaction	3.897	0.983	161	205	129	36	1	532

### 4.2. Data Testing

Table (2) shows the results of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), Average Variance Extracted (AVE) and Factor Loading (FL) for each variable and the corresponding constructs. It could be observed that the KMO and AVE values are all

above 50% and the FL are all above 0.4, which means that the research variables have adequate convergent validity. Reliability test is an assessment of the degree of consistency between multiple measurements of a variable. Cronbach's alpha is the most widely used reliability measurement tool with a generally agreed lower limit of 0.7. Table (2) also provides an overview of the reliability scores. As can be seen from this table, all the alpha coefficients were above the required level of 0.7.

**Table (2) KMO, AVE, factor Loadings and Cronbach's Alpha of items**

Variables Under Study	Number of Items	KMO	AVE	Items	FL	Cronbach's Alpha
Training Quality	4	0.810	70.359	Item 1	0.749	0.857
				Item 2	0.750	
				Item 3	0.750	
				Item 4	0.566	
Simulation-Based Services	3	0.689	71.023	Item 1	0.637	0.787
				Item 2	0.770	
				Item 3	0.724	
Interactivity	3	0.716	73.449	Item 1	0.706	0.814
				Item 2	0.751	
				Item 3	0.746	
Satisfaction	2	0.500	79.887%	Item 1	0.799	0.709
				Item 2	0.799	

### 4.3. Hypotheses Testing

In this section, the findings of the model significance are presented through the correlation and regression analysis. This will provide a decision whether to accept or reject the hypotheses under study.

#### 4.3.1 Testing the First Hypothesis

This hypothesis is designed to test the impact of Interactivity on Students' satisfaction. Table (3) shows the correlation matrix between the two variables, where it was found that there is a significant, positive and moderate relationship between Interactivity and Students' satisfaction, as P-value = 0.000 and  $r = 0.535$ .

**Table (3) Correlation Matrix between Interactivity and Satisfaction**

		Interactivity	Satisfaction
Interactivity	Pearson Correlation	1	
	P-Value		
Satisfaction	Pearson Correlation	.535**	1
	P-Value	.000	

Also, table (4) shows the regression analysis of the impact of Interactivity on Students' satisfaction, where it was found that there is a significant impact of Interactivity on Students' satisfaction ( $B = 0.755$ , P-value = 0.000). Also, R square was found to be 0.357, which means that 35.7% of the variation in Students Satisfaction is explained by Interactivity.

**Table (4) Regression Analysis of Interactivity on Students' Satisfaction**

	Unstandardized Coefficients		T	P-Value	R Square
	B	Std. Error			
(Constant)	.901	.087	10.309	.000	0.357

Interactivity	.755	.052	14.592	.000
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The regression equation could be stated as follows:

$$\text{Students Satisfaction} = 0.755 * \text{Interactivity} + 0.901$$

Thus, the first hypothesis was accepted, which is:

*H<sub>1</sub>: Interactivity significantly affects students' satisfaction with training in maritime transport.*

#### 4.3.2 Testing the second Hypothesis

This hypothesis is designed to test the impact of Simulation-Based Services on Students' satisfaction. Table (5) shows the correlation matrix between the two variables, where it was found that there is a significant, positive and moderate relationship between Simulation-Based Services and Students' satisfaction, as P-value = 0.000 and r= 0.585.

**Table (5) Correlation Matrix between Interactivity and Satisfaction**

		Simulation-Based Services	Satisfaction
Simulation-Based Services	Pearson Correlation	1	
	P-Value		
Satisfaction	Pearson Correlation	.585**	1
	P-Value	.000	

Also, table (6) shows the regression analysis of the impact of Simulation-Based Services on Students' satisfaction, where it was found that there is a significant impact of Interactivity on Students' satisfaction (B=0.687, P-value = 0.000). Also, R square was found to be 0.521, which means that 52.1% of the variation in Students Satisfaction is explained by Simulation-Based Services.

**Table (6) Regression Analysis of Simulation-Based Services on Students' Satisfaction**

	Unstandardized Coefficients		T	P-Value	R Square
	B	Std. Error			
(Constant)	.819	.082	9.935	.000	0.521
Simulation-Based Services	.687	.041	16.613	.000	

The regression equation could be stated as follows:

$$\text{Students Satisfaction} = 0.687 * \text{Simulation-Based Services} + 0.819$$

Thus, the second hypothesis was accepted, which is:

*H<sub>2</sub>: Simulation-Based Services significantly affect students' satisfaction with training in maritime transport.*

#### 4.3.3 Testing the third Hypothesis

This hypothesis is designed to test the impact of Training Quality on Students' satisfaction. Table (7) shows the correlation matrix between the two variables, where it was found that there is a significant, positive and moderate relationship between Training Quality and Students' satisfaction, as P-value = 0.000 and r= 0.660.

**Table (7) Correlation Matrix between Quality and Satisfaction**

		Training Quality	Satisfaction
Training Quality	Pearson Correlation	1	
	P-Value		

Satisfaction	Pearson Correlation	.660 **	1
	P-Value	.000	

Also, table (8) shows the regression analysis of the impact of Training Quality on Students' satisfaction, where it was found that there is a significant impact of Interactivity on Students' satisfaction (B=0.773, P-value = 0.000). Also, R square was found to be 0.634, which means that 35.7% of the variation in Students Satisfaction is explained by Training Quality.

**Table (8) Regression Analysis of Training Quality on Students' Satisfaction**

	Unstandardized Coefficients		T	P-Value	R Square
	B	Std. Error			
(Constant)	.570	.080	7.103	.000	0.634
Training Quality	.773	.038	20.234	.000	

The regression equation could be stated as follows:

$$\text{Students Satisfaction} = 0.773 * \text{Training Quality} + 0.570$$

Thus, the third hypothesis was accepted, which is:

H<sub>3</sub>: Perceived Training Quality significantly affects satisfaction with training in maritime transport.

#### 4.3.4 Testing the fourth Hypothesis

This hypothesis is designed to test the mediation impact of Training Quality between Interactivity and Students' satisfaction. To test this impact according to Sobel test, three steps are followed. First, testing the impact of Interactivity on Training quality; second, testing the impact of Interactivity on Students' Satisfaction; and third, testing the impact of both; Interactivity and Training Quality on Satisfaction. To find a mediation impact, the researcher should find a significant impact in the steps mentioned.

Table (4) showed the significant impact of Interactivity on students' satisfaction, which is the first step in mediation. Table (9) below shows the impact of Interactivity on Training Quality, which is the second step in testing the mediation. It was found that there is a significant impact of Interactivity on Training Quality (B=0.713, P-value = 0.000). Also, R square was found to be 0.378, which means that 37.8% of the variation in Training Quality is explained by Interactivity.

**Table (9) Regression Analysis of Interactivity on Training Quality**

	Unstandardized Coefficients		T	P-Value	R Square
	B	Std. Error			
(Constant)	.842	.071	11.798	.000	0.378
Interactivity	.713	.042	16.885	.000	

The regression equation could be stated as follows:

$$\text{Training Quality} = 0.713 * \text{Interactivity} + 0.842$$

Table (10) below shows the impact of Interactivity and Training Quality on students' satisfaction, which is the third step in mediation. It was found that there is a significant impact of both; Interactivity and training Quality, as P-values = 0.000, which are less than 0.05. This means that there is a partial mediation of Training Quality between Interactivity and Students' Satisfaction. Also, R square was found to be 0.710, which means that 71% of the variation in Students Satisfaction is explained by Interactivity and Training Quality. This

means that the independent variable; Interactivity, is still significant in the presence of the mediator; Quality, implying a partial mediation of Quality in the relationship between Interactivity and Satisfaction.

**Table (10) Regression Analysis of Interactivity and Training Quality on Satisfaction**

	Unstandardized Coefficients		T	P-Value	R Square
	B	Std. Error			
(Constant)	.381	.085	4.488	.000	0.710
Interactivity	.314	.055	5.667	.000	
Quality	.618	.046	13.436	.000	

The regression equation could be stated as follows:

$$\text{Students Satisfaction} = 0.314 * \text{Interactivity} + 0.618 * \text{Quality} + 0.384$$

Thus, the fourth hypothesis could be accepted, which is:

*H<sub>4</sub>: Perceived Training Quality significantly mediates the relation between Interactivity and Students' Satisfaction.*

#### 4.3.5 Testing the fifth Hypothesis

This hypothesis is designed to test the mediation impact of Training Quality between Simulation-Based Services and Students' satisfaction. To test this impact according to Sobel test, three steps are followed. First, testing the impact of Simulation-Based Services on Training quality. Second step is testing the impact of Simulation-Based Services on Students' Satisfaction. Third step is testing the impact of both; Simulation-Based Services and Training Quality on Satisfaction. Table (6) showed the significant impact of Simulation-Based Services on students' satisfaction. Table (11) below shows the impact of Simulation-Based Services on Training Quality, where it was found that there is a significant impact of Simulation-Based Services on Training Quality (B=0.700, P-value = 0.000).

**Table (11) Regression Analysis of Simulation-Based Services on Training Quality**

	Unstandardized Coefficients		Standardized Coefficients	T	P-Value
	B	Std. Error	Beta		
(Constant)	.670	.062		10.760	.000
Simulation-Based Services	.700	.031	.697	22.406	.000

The regression equation could be stated as follows:

$$\text{Training Quality} = 0.700 * \text{Simulation-Based Services} + 0.670$$

Table (12) below shows the impact of Simulation-Based Services and Training Quality on, where it was found that there is a significant impact of both; Simulation-Based Services and training Quality, as P-values = 0.000, which are less than 0.05. This means that there is a partial mediation of Training Quality between Simulation-Based Services and Students' Satisfaction. This means that the independent variable; Simulation-Based Services, is still significant in the presence of the mediator; Quality, implying a partial mediation of Quality in the relationship between Simulation-Based Services and Satisfaction.

**Table (12) Regression Analysis of Simulation-Based Services and Training Quality on Satisfaction**

	Unstandardized Coefficients	Standardized Coefficients	T	P-Value
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	B	Std. Error	Beta		
(Constant)	.434	.082		5.292	.000
Simulation	.285	.052	.243	5.478	.000
Quality	.574	.052	.491	11.071	.000

The regression equation could be stated as follows:

$$\text{Students Satisfaction} = 0.285 * \text{Simulation-Based Services} + 0.574 * \text{Quality} + 0.434$$

Thus, the fifth hypothesis could be accepted, which is:

*H<sub>5</sub>: Perceived Training Quality significantly mediates the relation between Simulation-Based Services and Students' Satisfaction.*

## 5. Discussion and Conclusion

The results showed above imply the importance of the dimensions under study; Interactivity, Simulation-Based Services and Training Quality with respect to Students' Satisfaction. This means that the department of Maritime Transport has to give high consideration for the three factors to be able to maintain and improve the level of students' satisfaction to increase the competitive advantage and retain students for further courses provided by the department. Also, it was found that there is a low percentage of students who ranked the dimensions between good and average, which is the zone that needs more efforts to be minimized to increase students' competitive advantage among institutes offering same courses that are provided by the maritime transport department of AASTMT. This was observed through the mean values as well, which are all around the value 4, referring to the zone of very good agreement.

In addition, it was found that there is a partial mediation of perceived quality between both; Interactivity and Simulation-Based Services on one side and Students' Satisfaction on the other side. This implies the importance of perceived quality and that a large portion of the impact of both; Interactivity and Simulation-Based Services on Students' Satisfaction does happen through the existence of a desired level of perceived quality. A further study could be done to evaluate the current model obtained in each of the training courses provided. Also, a study could be done to evaluate the difference in the dimensions under study according to different training courses provided. In addition, a study could be done to evaluate the differences in the dimensions under study according to different demographics, such as: Age and experience.

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