

THE EFFECT OF 9 E INSTRUCTIONAL LEARNING AND TEACHING MODEL ON STUDENTS' IMPROVEMENT CRITICAL THINKING SKILLS

KHALID JAVED ASSI

UUM Malaysia

NORAZLINDA SAAD

UUM Malaysia

SURENDRAN SANKARAN

UUM Malaysia

Abstract

Past studies have been conducted to examine the achievement of students and performance in developed countries, but only rare researches were addressed in developing countries like Pakistan. Pakistan is still lacking behind to conduct the research in the improvement Critical Thinking Skills (CTS) practices. In this study to determine interpretation and analysis based on 9 E learning and teaching model in statistics learning 12th grade students of CTS improvement. This research studies a descriptive by its nature. A total number of 110 student's 12th grade (60 boys and 50 girls) statistics students were selected sample through stratified random sampling, and two colleges were selected with randomly sampling approach. The data was collected through questionnaire contained 5-point Likert scale. The two questionnaires (9 E learning and teaching instructional model and CTS interpretation, analysis) were developed for this study. 9 E learning and teaching instructional practices were an independent variable, whereas CTS namely interpretation, and analysis was a dependent variable. There were total 36 questions of 9 E learning and teaching instructional model and total 25 questions of interpretation and analysis of CTS. The students were taught with 9 E learning and teaching model based. The result of the study showed that there was strong and positive effect of 9 E learning and teaching instructional practices on students CTS of the interpretation and analysis at 12th grade students. The finding of the study has revealed that there were nine processes involved in the development of CTS among students during the interpretation and analysis. The study would be helpful for teachers and students, improvement in teaching and implementing new learning approaches with instructional learning and teaching. However, there are limited research studies carryout with the 9 E learning and teaching model with CTS of the statistics students. This study will be able to respond the interpretation and analysis, whether the effectiveness relationship 9 E learning and teaching model and CTS of statistics in Pakistan.

Keywords: 9 E instructional learning model, critical thinking skills, interpretation and analysis

1. Introduction

Teaching and learning is the process through different method from one side to other side with proper way. In these process three elementary components is part and parcel each other i.e. the teacher, the learner and the content. All of these are mandatory, there should be linked with each other, for undergoing the education process in systematic way. Now a day's education process is short, due to different emergence epidemic circumstance. But educational process without these main three elements still in complete and stills teacher are teaching extra ordinary essential part in students

learning especially in developing country like Pakistan. Different method and techniques instigated form side by side for interpretation and analysis skills.

All over the world, it is generally acknowledged that CTS are important for students learning to meet the new challenges in ever-changing world where is essential to determine the relationship with 9 E learning model and students' CTS. Different scholars and educationist, agreed upon, the reality that CTS makes students independent with improve their learning on complex statistics content (Daud & Hafsari, 2015; Firdaus, Kailani, Bakar, & Bakry, 2015; Muhlisin, Susilo, Amin, & Rohman, 2016). Widana et al. (2018) expressed that educational institutions, especially colleges, have a key role in developing CTS. Even though students are not necessarily conscious of their CTS progress and teachers adopt the learning and teaching differing methods to critical thinking teaching. In general CTS will always be an essential skill for the student, which will be helpful in their profession. CTS are in high stress by the students in education (Hyytinen, & Postareff, 2018). Consequently, learning CTS is effectiveness for students and HSS teaching staff using 9 E learning and teaching methodologies is an essential element to the continuous practices for the betterment of the students in future. In this way to increase the interpretation and analysis skills in the students of subject statistics at HSS level.

2 Literature Review

2.1 Critical thinking skills

Different researcher defined critical thinking skills (CTS) in different perspective based on their application. D'Alessio, Avolio, and Charles (2019) define the CTS as 'reasonable, thoughtful thinking that what way to be interpretation and analysis. Another researcher PRAYOGI and YUANITA (2018) believe that CTS can be taught and learned through learning and teaching instruction.

Erdogan (2019) stated that very real research conducted in Pakistan related to CTS, the educationist should increase the CTS with models in students at a mass level. Sari and Erdogan (2019) urged that education ministry is play vital role to construct CTS of the student, within problems their situation in the field of education. Different researcher have focused on interpretation and analysis skill on the educators, during the teaching and learning or preparation (Bourn, 2018; Kędra, 2018; Sánchez, Fernández, & Llinares, 2019; Tebabal, & Kahssay, 2011). There is lack of study exploring the interpretation and analysis skill with those as the content and other subject knowledge. While systematic or logical interpretation and analysis skill, there is limited communication among the learning and teaching in students (Alhamlan, at al.2018; Popat, & Starkey, 2019). Correspondingly, these gaps in the study suggest and essential to address the concept of learning and teaching interpretation and analysis skills in statistics subject (Wilson et al. 2018; Roberts, 2018) and understanding in detail of interpretation and analysis skill through 9 E learning and teaching model in students. The CTS be scattered in the Vision 2030 paper, therefore without any development or focusing a thinking mind and research being adopted, is like the bundle of the pamphlets. This kind of documents has no impact on vision 2030. A better CT has two skills dimension one CTS and other is critical thinking disposition dimensions. According to Seifert and Sutton (2019) CTS is self-guiding finding and

determined, which have six dimensions results interpretation, analysis, evaluation, explanation and inference. In this research study we observed only two dimension's i.e. interpretation and analysis with learning of 9ETE.

In the perspective of National Education Policy (NEP, 2009) importance of skills acknowledge, and need to reduce memorization which is often dominant in learning, and stressed that CTS include for the development of skills, that way meet the challenges of the modern world. Also contained that prospective for future student's ability, teacher rethink, and prepared itself for the development students' skills (Anspal, Leijen, & Löfström, 2019; Slade et al., 2019). It is observed that CTS has been ignored educational goals in the syllabus as well as in the students' assessment by the teachers (World Bank, 2006). Higher Education Commission reflected the importance of developing CTS, also set the objectives in education how they achieve the CTS. In the policy learning and teaching is broader goals in all levels education to encourage and essential to develop CTS (NEP, 2009).

2.2 9 E instructional learning model

In the last two decade the effective learning and teaching method was described while attaining the content knowledge during thinking skills of the students. Erikson and Erikson (2019) expressed that teacher are not able to complete the syllabus that's why the development CTS towards students not upright. The better learning and teaching process develop the CTS, by help of the good opportunities increase the interpretation and analysis skills in students (Bustami, Syafruddin, & Afriani, 2018). The learning and teaching method is difficult and complex in the real world state of affair education (Leal et al., 2018). In this time a required to develop new aspect of interpretation and analysis in college students, this is because of the addresses students learning, new students acquired learning pattern during the studying and they able to interpretation and analysis. They gave a chance to determine their own by learning with interaction of their teacher during teaching learning (Jabbarova, 2020; Sadeghi, 2019). Additionally, while students are studying the subject content and time to time, there will be change in the learning, it's influenced in different subject content of learning.

The improvement interpretation and analysis skill by learning method, numerous researches conducted to promote these skills in students by transmission of knowledge content (Ma, Xin, & Du, 2018; Massoth, et al., 2018). The learning method inspires students learning skills for its own better results. Student are learning improvement greater determination in the subject content knowledge. Moreover by learning and teaching model students help out in academic better results that were statistically significance to learner whose adopt learning method (Tsai et al., 2020). So, the learning method that emphasizes on the learning procedure, to increase the learning ability in interpretation and analysis on outcomes in learning improvement (Mulyanto, Gunarhadi, & Indriayu, 2018; Rind, & Mughal, 2020).

Belecina and Ocampo Jr (2018) characterized CTS as the use of strategies to increase the probability with an appropriate interpretation. The use of all CTS can be observed in consensus expert opinion organized by A. Facione (1990) and incorporates interpretation, analysis, evaluation, inference, explanation, and self-regulation. Most of the students have not enough excellent CTS, Students also need to be able to

recognize when the skills are needed during the learning and use interpretation and analysis skills (A. Facione, 1990; Halpern, 1998). CTS will help students in learning be more systematic, intrusive, thoughtful, and assured in reasoning (P. A. Facione, 1998). The researcher limits the CTS to skills namely interpretation and analysis.

Finally, A. Facione (1990) uses skills and organize in consensus by the expert opinion. They classified interpretation, analysis, inference, evaluation, explanation, and self-regulation. The researcher limits the critical thinking skills to skills namely interpretation and analysis. The interpretation, which means to know data, events, rule, and judgement and so on (Yıldız, 2021). Interpretation and analysis skills must recognize as fundamental skills, to observe how students interact in the pattern of learning and teaching. The interpretation skills support the students in high quality analysis by providing what something means of learning and insight into importance of what is students applying. The analysis, which means to examining ideas, cause with concept identify, and outcomes the relationships among the concepts, outcomes and others procedures draw the conclusions (Snyder, 2019).

There are many studies describing CTS instructional and teaching methodologies. The subsequent the most prominent of 9 E teaching and instructional methodologies which could be easily integrated or to be assist the teacher in teaching for assessing students in CTS of two dimension. The support and help of interpretation skills, students provide better quality results which is the importance of what a students is saying, what to do. In fact, the evidence, reasons, methods, criteria, and conclusions are.

The following prominent methodologies could easily be integrated to assist the teachers in teaching their students CTS.

1. Serin (2018) expressed that student gave a potential to be responsible to learning and enhance their CTS.
2. Students promote their CTS by creating and formulated their own questions during learning (Amin & Adiansyah, 2018).
3. Medeiros, Ramalho, and Falcão (2018) further stated stimulate the CTS in students by linking need of a subject to other conditions conceivably students have their own capabilities.
4. Sasson, Yehuda, and Malkinson (2018) encourage the CTS by transferring acquired 9 E learning and teaching methodology in different situation.

Teacher is vibrant to adopt new method of learning statistics to achieve the interpretation and analysis skills. If teacher are follow the 9 E learning and teaching model and use during the teaching as active role. The students have better results in interpretation and analysis statistics subject content (Mertler, & Reinhart, 2016). A list of long detail learning and teaching by 3E, 5E, 7E and 9 E on different topics and subject and different classes for research offers by different researcher. The current 9 E learning and teaching model present by Kaur and Gakhar (2014).

Kaur and Gakhar (2014) expressed that 9 E learning and teaching model is the process in learning and teaching which help in analysis command in clear with precise way to achieve the high efficacy. Consequently, in this study, the 9 E learning model having elicit, engage, explore, explain, elaborate, echo, evaluation, emend, and e-

search. These 9 E Learning model is a process of learning and teaching to be integrated by learning, to investigate subject knowledge, knowledge subject difficulty, knowledge the teaching method, knowledge the assessment and knowledge of searching to get more itemized learning in whole education system.

The researcher represents robust reports to advocate CTS in education development (Paul & Elder, 2008a; Senechal, 2010; Changwong, Sukkamart, & Sisan, 2018). Widana et al., (2018) further stated clearly to measure and development CTS for the learner. The development of CTS, it can be achieved through jointly learning with 9 E learning and teaching model. Learning CTS is still so difficult at HSS level by the students. Adopting latest learning model of 9 E learning and teaching model is a possible suitable indicator for the development of CTS.

According to CTS elements A. Facione (1990) based on six skills. As a result of the analysis, it can be concluded that the corresponding skills are as shown below.

Table: 1 Critical Thinking Skills and Sub-skills

Critical Thinking Skills	Skills	Sub- Skills
Interpretation	Understanding the Questions	Understand the question given, Read the information carefully, Find the information Categorization, Clarifying Meaning
Analysis	Identify the problem, Recall	Examining Ideas, Identifying Arguments Analysis Arguments ,Relate the problem given with concept Identify the cause,

2.3 Research objectives

Keeping in view the research topic, the following research objectives were formulated:

- i. To analyze the interpretation skills of CTS through 9 E learning and teaching model in students.
- ii. To explore the analysis skills of CTS through 9 E learning and teaching model in students.

2.4 Research Questions

- i. What is the interpretation skill through 9 E learning and teaching model in students?
- ii. What is the analysis skill through 9 E learning and teaching model in students?

3. Methodology

3.1 Methodology overview

To achieve the research study objective, the researcher used quantitative research methodology.

This research study designed to analyze interpretation skills in CTS through 9 E learning and teaching model in students and also explore the analysis skills of CTS through 9 E learning and teaching model in students. This research study descriptive research approach observed how normal, how concentrate and how much relationship with the study. This study motives was selected for precise method, which was design with the existing learning theories, to quantitatively test the hypotheses, to observe the effect of the learning and teaching. The method match with study sample. This study also examine the 9 E Learning and teaching (IV) with specific interpretation and analysis (DV). This research focus on analyze the interpretation skills of CTS through 9 E learning and teaching model in students. Correspondingly explore the analysis skills of CTS through 9 E learning and teaching model in students.

A descriptive research design was suitable for this study as 9 E learning and teaching model is too specific for analyzing IV that can be influence in learning IV and DV. Two questionnaires were adopted for the data collection. One questionnaire about 9 E learning and teaching model and other was observation the interpretation and analysis skill of the CTS. Descriptive research design is being used where two or more classes being linked. In this research study teacher taught the students with 9 E learning and teaching model, to observe the interpretation and analysis skills. To observed the relationship Pearson Correlation analysis, descriptive analysis and ANOVA was used to determine the to analyze the interpretation skills of CTS through 9 E learning and teaching model in students also explore the analysis skills of CTS through 9 E learning and teaching model in students.

3.2 Population and sample of the Study

In this study, all the twelve grade statistics students of the District Bahawalpur who opted Statistics as an optional subject were defined as the accessible population of the study. Government College for Women Satellite Town Bahawalpur and Government Post Graduate College One Unit Chowk Bahawalpur, were selected sample colleges. The sample of the study consisted of 110 (60 boys & 50 Girls) statistics students attending two different sections and two different institutions in Pakistan. There were sample of 60 male (54.55%) students and 96 (45.45%) were female students. Their attendance duration the data collection was 100% each male and female students. Students' ages was varied from 17 to 20 years.

3.4 Data Analysis

The data was analyzed through descriptive and inferential statistics. An ANOVA test was conducted to examine students' responses about interpretation and analysis by teaching 9 E learning and teaching. To observe the relationship between dependent and independent variables a Pearson Correlation analysis was used. To end with to examine the relevancy and relationship a regression equation block method was used and factors predicting of CTS dimension.

The improvement of students CTS was different learning methods in different subjects' areas Mahanal, Zubaidah, Sumiati, Sari, and Ismirawati (2019). CTS are essential for each student because they take part for the development thinking. Mustika, Nurkamto, and Azizah (2019) explore that CTS are only one of the rudimentary requirements for

each student has to develop. The CTS have six dimensions. The interpretation and analysis, of these two dimensions questions related were giving answer with coded as '1' for right and '0' for wrong answers. Interpretation dimension consisted of eight questions, and the analysis dimensions had also eight questions. Interpretation and analyses dimensions scores were based on both four multiple choices. 9 E learning and teaching model consists of 36 items. These dimensions were coded with 5 Likert type scale, 1= totally disagree, 2=disagree, 3=undecided, 4=agree, 5=totally agree.

DEMİR (2006) was developed the scale which is used in this study. DEMİR (2006) find out, Pearson's correlation "r" value was .76 for the interpretation dimensions, and .71 were for the analysis. Reliability values were found .81 for interpretation dimension, and .88 for analysis dimension. Erlangsen (2018) believed that teacher involve students in learning with different ways to enhance CTS. Constructivist approach uses 9E learning model (Ramaligela, Ogbonnaya, & Mji, 2019). Constructivist theory emphasizes student role in active learning while encouraging students to increase CTS in their learning (Ramaligela et al., 2019). Therefore, teachers promote learning through 9 E learning and teaching model. This model engages the students' ability by constructivist theory. Thus, teacher apply constructivist theory to create and enhance CTS through 9 E learning i.e., Elicit (EC), Engage (EG), Explore (EP), Explain (EL), Echo (EO), Elaborate (EB), Evaluate (EV), Emend (EM) and E-Search (ES) in subject statistics.

3.5 Descriptive Analysis of 9 E learning and Teaching Model

Students 9 E learning and teaching model Mean (M), Standard Deviation (SD) and Range (R) values were analyzed for each question (EC, EG, EP, EL, EB, EO, EV, EM, and ES). The results were shown in table 2.

Table: 2 The average scale score of 9 E learning and Teaching Dimensions

9 E Dimensions	R	M	SD	Skewness	Kurtosis
1-EC	47-19	24.47	6.15	0.885	1.004
2-EG	43-16	29.11	4.98	0.138	0.471
3-EP	48-20	33.82	6.48	0.512	-0.184
4-EL	45-18	33.6	5.72	-0.182	-0.191
5-EB	46-21	10.35	10.65	0.21	0.044
6-EO	43-18	4.49	8.59	-0.393	0.128
7-EV	45-20	33.6	s	-0.182	-0.191
8-EM	47-22	33.82	6.48	0.512	-0.184
9-ES	42-17	4.49	8.59	-0.393	0.128
CTS Interpretation and Analyze	Interpretation (n=110. 36%)		Analysis (n=110. 25%)		

The lowest mean ($M = 23.47$, $SD = 5.95$) was observed in ES dimension and the highest mean ($EP = 33.82$, $SD = 6.48$) was observed in EP dimension. The scores obtained of 9 E learning and teaching model was best results in students' interpretation were 36% and the other analysis was 25 %.

Table: 3 Descriptive statistics for the CTS

Items	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Interpretation	1106.00	9.00	7.55	.98	-1.01	-.252	
Analysis	1103.00	10.00	7.85	1.72	-.36	-.564	

According to the analysis, the mean ($M = 7.55$, $SD = .98$) was observed in interpretation dimension and the mean ($M = 7.85$, $SD = 1.72$) was observed in evaluation dimension. The mean scores on the CTS dimensions scale were high. Students had a high ability in analysis.

3.6 Analysis of Variance CTS by 9 E learning and teaching Model

Analysis of Variance (ANOVA) showed the relationship between 9 E learning and teaching model and CTS two dimensions. The results are given below table 4.

Table: 4 Analysis of Variance Results for 9 E learning and teaching instructional to CTS

CTS	9 E Learning & Teaching	N	M	SD	Mean Square	F _(3, 221)	P
Interpretation	a- Elicit	110	7.93	1.78	4.302	3.754	.149*
	b-Engage	110	6.48	0.83			
	c-Explore	110	7.14	1.08			
	d-Explain	110	8.22	1.97			
	e-Elaborate	110	7.79	1.69			
	f-Echo	110	8.53	1.20			
	g-Evaluation	110	8.21	1.99			
	h-Emend	110	7.77	1.08			
	i-E-search	110	6.67	0.75			
Analysis	a- Elicit	110	7.67	1.04	4.242	3.856	.009*
	b-Engage	110	7.78	1.01			
	c-Explore	110	7.42	0.93			
	d-Explain	110	7.81	1.32			
	e-Elaborate	110	7.73	1.33			
	f-Echo	110	6.93	1.36			
	g-Evaluation	110	7.95	1.19			
	h-Emend	110	8.58	1.71			
	i-E-search	110	6.04	0.86			

*p<.01

The results showed, there were no significant difference on interpretation dimension ($f=.834$, $p<.01$) in terms of the 9 E learning and teaching. On the interpretation dimension, E-search had lower scores ($M= 6.67$, $SD= 0.75$) than engage ($M= 6.48$, $SD= 0.83$) and echo ($M = 8.53$, $SD = 1.20$) ($F = 3.754$, $p<.01$). On analysis dimension, E-search ($M = 6.04$, $SD=0.86$) had lower scores than explore ($M = 7.42$, $SD = .93$) and engage ($M =7.78$, $SD=1.01$) ($F = 3.856$, $p<.01$).

The score's interpretation on CTS dimensions scale, evaluation ($M = 8.21$, $SD =1.99$) and explanation ($M =8.22$, $SD =1.97$) had higher scores than elicit ($M=7.93$, $SD=1.78$) and Elaborate ($M=7.79$, $SD=1.69$). Analysis of interpretation dimension and analysis

scores of CTS scale revealed a large effect size. The other dimension effect size was found to be at medium level (Shaw et al., 2020). The teaching with 9 E learning and teaching model had an important effect on two dimensions.

3.7 Correlation and regression Analysis

Determine the two dimension of CTS, correlation analysis were associated with EC, EG, EP, EL, EO, EV, and EM modes of 9 E learning and teaching. The analysis results showed in the table 5 below.

Table: 5 Correlation Analysis

	1	2	3	4	5	6	7	8	9	10	11
1-Interpretation	1										
2-Analysis	.43**	1									
3- CTS	.63**	.67**	1								
4-EC	.52**	.35**	.31**	1							
5-EG	.31**	.36**	.34**	.40**	1						
6-EP	.38**	.66**	.56**	.33**	.38**	1					
7-EL	.27**	.30**	.38**	.18**	.31**	.43**	1				
8-EB	.36**	.39**	.55**	.44**	.48**	.38**	.36**	1			
9-EO	.36**	.33**	.38**	.39**	.37**	.47**	.29**	.27**	1		
10-EV	.30**	.38**	.36**	.27**	.30**	.68**	.39**	.41**	.39**	1	
10-EM	.42**	.48**	.49**	.36**	.39**	.55**	.44**	.48**	.35**	.42**	1
11-ES	.38**	.36**	.27**	.32**	.38**	.56**	.38**	.30**	.34**	.38**	.41**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed)

The results showed that there was a positive correlation between the 9 E learning and teaching dimensions two CTS. The lowest correlation was observed between the interpretation dimension and the EL learning and teaching model ($r = .18, p < .01$). In analysis dimension highest correlation was observed between the analysis dimension and EV learning and teaching variable ($r = .68 < .01$).

There was a significant meaningful difference among all independent variables and also positive correlation ($p < .01$). There was a medium level correlation between two dependent variable of CTS ($r = .67, p < .05$) and EV ($r = .68, p < .05$), EM ($r = .55, p < .05$), ES ($r = .56, p < .05$). There were significant relationship among 9 E learning and teaching model and interpretation, analysis dimensions of CTS.

The predictor variables included in the equation were as follows: the first block consisted of the dependent variable CTS and the second block consisted of the 9 E learning and teaching model by EC, EG, EP, EL, EB, EO, EV, EM, and ES. The results are presented in table 6.

Table: 6
 Regression Analysis 9 E learning and teaching model on two CTS dimension

Dependent Variables	Independent Variables	β	Std. Error	t	p	R	R ²	df	F
<i>Interpretation</i>	EC	0.517	0.006	9.025	0				
	EG	0.439	0.006	6.752	0				
	EP	0.159	0.009	2.451	0.02				
	EL	0.656	0.007	12.99	0				
	EB	0.556	0.007	10	0	0.517	0.27	1, 223	81.454
	EO	0.487	0.008	7.768	0				
	EV	0.145	0.007	2.319	0.02				
	EM	0.406	0.011	6.639	0				
	ES	0.470	0.040	7.727	0				
Analysis	EC	0.274	0.013	3.929	0				
	EG	0.205	0.018	3.662	0				
	EP	0.488	0.007	8.577	0				
	EL	0.412	0.008	6.326	0				
	EB	0.152	0.013	2.316	0.02	0.613	0.37	2, 222	66.881
	EO	0.581	0.036	10.65	0				
	EV	0.47	0.04	7.727	0				
	EM	0.226	0.027	3.712	0				
	ES	0.666	0.009	13.58	0				

In the stepwise regression analysis, EC, EG, EP, EL, EB, EO, EV, EM, and ES with 9 E learning and teaching as the independent variables. The dependent variables were interpretation and analysis. It was observed that each 9 E learning and teaching model

variables made an independent contribution to the equation. The observed values were as follows: interpretation dimensions, EC ($\beta = .517$), EG ($\beta = .439$), EP ($\beta = .159$), EL ($\beta = .656$), EB ($\beta = .556$), EO ($\beta = .487$), EV ($\beta = .145$), EM ($\beta = .406$) and ES ($\beta = .47$), analysis dimensions EC ($\beta = .274$), EG ($\beta = .205$), EP ($\beta = .488$), EL ($\beta = .412$), EB ($\beta = .152$), EO ($\beta = .581$), EV ($\beta = .47$), EM ($\beta = .226$) and ES ($\beta = .666$). It was found that EP ($\beta = .159$) and EV ($\beta = .145$) predicted the interpretation and EG ($\beta = .205$), and EB ($\beta = .152$) predicted the critical thinking skills.

5. Conclusion and discussion

The main purpose of this research study was determine the effectiveness of teaching based on 9E learning and teaching model and teaching of statistics subject 12th grade students. Duration teaching statistics improvement of two dimensions CTS, with preferred 9 E learning and teaching , modes of learning was (EC, EG, EP, EL, EB, EO, EV, EM, and ES) variables to foresee interpretation and analysis CTS. The results showed that the principal of learning and teaching was interpretation, followed by analysis. It is very manifest that CTS have remarkable prominence in student learning (Jablonka, 2020). Mostly researcher and educationist have esteemed CTS in each level of education and every subject. This make the students perilous thinkers in learning with the used of core CTS. Any subject content study still incomplete without interpretation and analysis skills with help of core CTS.

In this study, the preferred 9 E learning and teaching model was found to be the interpretation in explain (EL), elaborate (EL), and analysis in explore (EP), echo (EO) in combined second place. These findings are contrary to research study, in which they describe the 9 E learning and teaching model. On the other studies related to students learning and teaching choices having different results (Mahmoud, 2012). A positive correlation was found between interpretation and 9 E learning teaching as well in analysis during the research study. The highest correlation was found between the EV variable in interpretation dimension. The lowest correlation was seen between the EL variable and analysis dimension. There were positive medium level correlation between all dependent and independent variables. Din (2020) and Ismail, Muhammad, Kanesan, and Ali (2019) found similar results.

Optimistically, this kind of research carried out other researcher convey better results in the field of teaching, but also new learners in their research journey, especially in major science subject teaching. Finally, teacher are in faith and way to adopt or apply 9 E learning and teaching model, to find better solutions in statistics subject for interpretation and analysis skills with their own way and own approaches to move forwarded better learning. Believers of CTS evidenced that students who are learned subject by himself, with their own thinking and focusing on interpretation and analysis is better while evaluation (Dyer, & Hall, 2019). However without 9 E learning and teaching by the educators could not be affective learning. The current study was conducted with only 110 sample students. Moreover, students could not be divided into ages categories because students' were the same age group. Comparing the results of interpretation and analysis of CTS with 9E learning and teaching, students will help in understanding E-search and evaluation; they have better correlation between in EV interpretation dimension better learning. According to Cantor, Osher,

Berg, Steyer, and Rose (2019) learning are not static in individual student. Thus learning and teaching should be based on 9 E learning and teaching model, preference rather than their own learning and teaching process. The research studies conducting with larger samples and comparing results with studies interpretation, analysis and other CTS dimension. These results will be helping for better generalizing the findings. Searching of other variables of CTS by adopting 9 E learning teaching model and their effects on CTS will shed lights both on how to develop and understand CTS.

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