

HKBM 7004 Quantitative Research Methods

Doctor of business administration (UWTSD)

Topic of Assignment :

**The relationship between interactive teaching activities and students' learning outcome in
online tertiary educational programs**

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Abstract

This is a deductive and quantitative research to measure and identify the impact of ‘interactivity’ of teaching upon the ‘learning satisfaction’ and ‘learning outcome’ of students in online learning. The significance of the factors of students’ ‘self-efficacy’ and ‘attention’ in the equation are also measured.

The ‘interactivity’ of teaching (which includes interactivity in course content, in communication between instructor and students and among students) are found to have significant correlation with all four dependent variables of self-efficacy, attention, learning satisfaction and learning outcome.

The variables of self-efficacy and attention , each on their own, is found to have significant correlation with learning satisfaction and learning outcome. The single variable of learning satisfaction is similarly found to have significant correlation with learning outcome.

However, for the mediation effect of the dependent variables, no significant mediation effect is found for the variables of ‘self-efficacy’, ‘attention’ or ‘learning satisfaction’ in the relationship between interactivity and learning outcome. But there is finding of significant mediation effect of the variable of ‘attention’ in the relationship between ‘interactivity’ and ‘learning satisfaction’.

This research has informed educators the importance of ‘interactivity’ in respect of course design and course delivery, together with the significance of ‘attention’ and ‘self-efficacy’ in affecting learning satisfaction and learning outcome.

Background

With the onset of internet technology, digital pedagogical means had started to grow in late 1990’s. In a ten-year study of the nature and extent of online education in the united States (Allen and Seaman, 2013), it was found that online education had continued to expand at a rate faster than the traditional campus-based programs with no sign of abating.

The advantages of online learning are numerous, including flexibility, freedom to learn at once’s own pace, less travel, cheaper costing, closer supervision by educator, less domination by

outspoken students, etc. ‘Convenience’ is found the most cited reason for satisfaction in a three years’ survey in US (Cole et al, 2014).

After the attack of Covid-19 in 2020, online education has become almost an indispensable part of university education, particularly during societal lock down or quarantine of individual student.

Research problem

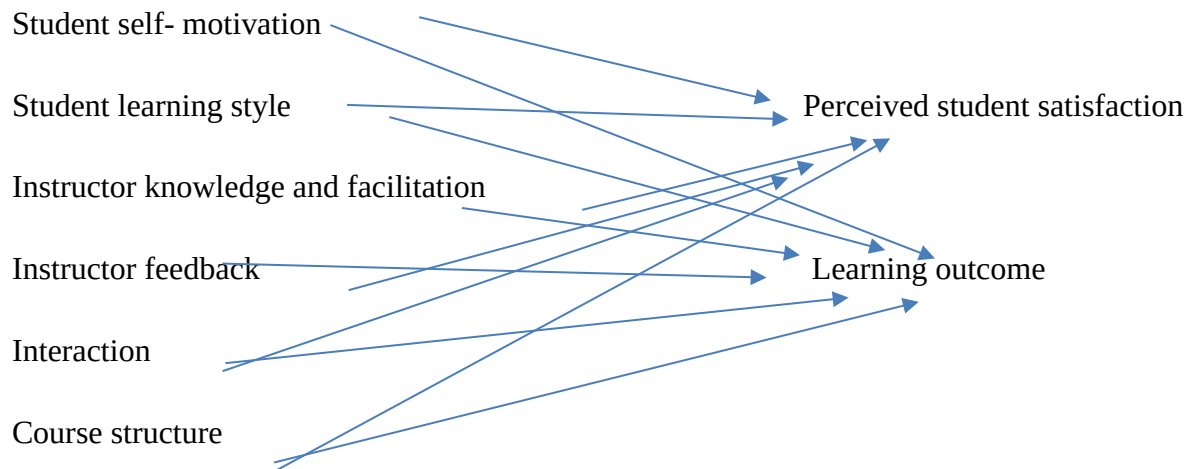
It has been mentioned in literature review that online education does not enjoy widespread acceptance by faculty or employers and cannot command necessary student discipline, thus resulting in low retention rates (Allen and Seaman, 2013).

With the likely continuation of Covid-19 and possible further outbreaks leading to societal limitation in travel and gathering, it can be reasonably foreseen that the demand for online education will unlikely abate in the near future. There is therefore a dire need for educators to find out if long-term engagement of digital pedagogy will impair the quality of university education or affect the students’ learning outcome in the long run, and if so, how should online pedagogy be improved to enhance students’ learning satisfaction and learning outcome.

Interactivity

A **conceptual framework of online education** proposed by Peltier, Drago and Schibrowsky (Peltier et al., 2003) consists of six elements : 1. Student self -motivation, 2. Student learning style , 3. Instructor knowledge and facilitation, 4. Instructor feedback Course structure, 5. Interaction & 6. Course structure.

A picture of the conceptual framework is shown as follows:



(Note: Factors no. 1 and 2 can be classified as ***self-efficacy***, whereas factors 3 to 6 are ***interactivity*** in online teaching and design).

Various literature research has shown that ***interactivity*** is a very important element in the perceived success of education. In a three-year study of graduates and undergraduate students' level of satisfaction with online instruction (sampling from students in the class of Legal Environment of Business and Legal Issues of Executive Management in a US University in the years of 2010 to 2013), it was found that ***lack of interaction*** was the most cited reason for dissatisfaction with the online learning experience (Cole et al., 2014). Dissatisfaction will lead to low attention, low motivation, low learning satisfaction and low retention, thus ultimately affecting students' learning outcome negatively.

Research purpose

It is considered necessary for educators to investigate into the relationship between the interactive elements in online teaching and the elements of success in online learning. Once the impact and significance of the interactive factors in online teaching are determined, appropriate steps may be taken to invest in the enhancement of interactivity in online pedagogy (whether in

terms of design, software, hardware and/or labor investment) so that online teaching may become a ***more effective, competitive and sustainable*** pedagogical means to serve in the post Covid -19 era.

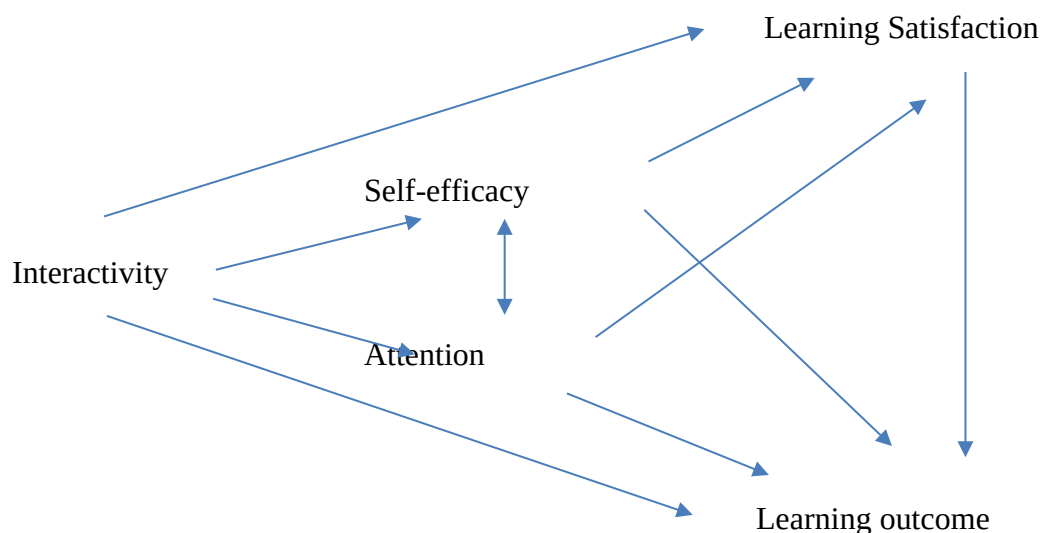
Research aim

It is the aim of this paper to investigate into the ***impact of interactivity in online teaching upon students' learning satisfaction and learning outcome.***

The relationship between interactivity of online teaching and the other variables contributing to successful learning outcome (i.e. ***self-efficacy, attention and learning satisfaction***) will be explored and measured.

Finally, the ***mediation effect*** of the variables of self-efficacy, attention and learning satisfaction upon the ultimate learning outcome will also be measured to find out the extent of their significance, if any.

(The following model demonstrates the **relationship network** between the various variables in the equation of success in online education, which is to be measured quantitatively by survey and correlation / regression approach in this research.)



Research questions

The following are the four major research questions of this investigation:

- (i) What is the nature and content of interactivity of online teaching?
- (ii) What are the factors (variables) contributing to successful online learning outcome?
- (iii) What is the impact of interactivity upon students' learning outcome?
- (iv) What is the significance of interactivity vis -a-vis the various dependent variables contributing to successful learning outcome ?
- (v) Is there mediation effect of the various dependent variables in the relationship between interactivity and learning outcome ?

Literature review

Factors for learning outcome

In a research carried out among 397 students in a university in Midwest USA (Eom , Ashill & Wen, 2006) , it was found that the six factors (variables) of online learning : **course structure, instructor feedback ,self-motivation, learning style, interaction and instructor facilitation** – all significantly influenced students' satisfaction .

However, only specific **learning styles** (visual and read/write learning styles) and timely/ meaningful **instructor feedback** were found to affect perceived learning outcomes .

Discussions of the factors leading to successful online learning outcome with reference to literature review are highlighted as follows:

Student self -motivation

Research showed that online learning requires a **commitment from students to active learning** more than in traditional setting (Upton 2006, p.29).

Self-regulated learning strategy was considered more important for online learning than traditional face-to-face learning (Eom, Ashill & Wen, 2006). The core of self-regulation was considered to be self-motivation (Smith, 2001) which was said to stem from self-efficacy (i.e. self-confidence in one's abilities) (Bandura, 1977).

The extant literature showed that students with strong motivation were usually more successful in learning in online courses (Frankola, 2001; LaRose & Whitten, 2000). A lack of motivation was linked to high dropout rates (Frankola, 2001; Galusha, 1997).

In the research study by Huang et al. (2005), it was found that **learning motivation was significantly correlated with learning outcome**.

However, in the study by Eom, Ashill and Wen, 2006, no significant correlation was found between students' self-motivation and perceived learning outcomes. The researchers could not explain such aberration and indicated further research work was needed to specify the conditions under which self-motivation was likely to have a positive, negative, or neutral effect on perceived outcomes.

Course structure

Course structure has two dimensions- (i) ***course objectives /expectation*** and (ii) ***course infrastructure*** (i.e. the usability of the course Web site and organization of the course material).

Moore (1991, p.3) opined that the course structure expressed the rigidity or flexibility of the objectives, teaching strategies and evaluation methods of the course, including how it could respond to each learner's individual need.

Eom, Ashill, and Wen (2006) tried to theorize that course structure was strongly correlated to user satisfaction and perceived learning outcome. However, the survey showed that there was **no significant relationship between online course structure and perceived learning outcome**. It was explained that there might be other factors such as meaningful feedback which had a greater impact on perceived learning outcomes.

Instructor knowledge and facilitation

Some widely accepted learning models are based on objectivism, constructivism, collaborativism, cognitive information processing and socio-culturalism (Leidner & Jarvenpaa, 1995).

It was advocated by Eom, Ashill and Wen (2006) that online learning systems could utilize more the ***constructivist model*** (i.e. learning at one' controlled pace), the ***collaboratism model*** (i.e. with student involvement) and the ***socioculturism model*** (individualistic learning , empowering students with freedom and responsibilities) . The teacher is arguably a ***facilitator*** who stimulates, guides and challenges his or her students, rather than merely focusing on delivery of instruction (Huynh, 2005).

Instructor feedback

Instructor feedback had been considered 'one of the most powerful component in the learning process (Dick & Carey, 1990, p. 165).

In E- learning, instructor feedback includes cognitive, diagnostic feedback and prescriptive feedback. It was argued by Eom, Ashill & Swen (2006) that instructor feedback could ***improve learners' cognitive skill, knowledge and activate metacognition*** in planning, monitory , and regulating cognitive activities (Pintrich , Smith , Farcia, & McKeachie, 1991) which could ***direct the learner's attention to learning outcomes*** (Ley, 1999) . When metacognition was activated, students became self-regulated learners (Chen , 2002; Zimmerman , 1989, 1989) .

Interactivity

Moore's (1989) communication framework classified engagement in learning through (a) ***interaction between participants and learning materials***, (b) ***interaction between participants and tutors/experts***, and (c) ***interactions among participants***. These three constructs were believed to determine the performance of Web-based course quality.

Students who had higher levels of interaction with instructor and peers reported higher levels of satisfaction and higher levels of learning (e.g. Swan, 2001). Several research studies had indicated that **interactive teaching style was strongly associated with high levels of user satisfaction and learning outcomes** (e.g. Arbaugh, 2000; Swan, 2001). Graham and Scarborough (2001) confirmed Swan's findings that 64 % of students felt that having access to a group of students was important. Picciano (1998) discovered that students perceived their learning from online courses to be related to the quantity of discussion that actually took place during the class. Students tend to verbalize what they are learning in the online course and articulate their understanding if they have opportunity to actively exchange communication with the instructor and fellow students (Chi & VanLehn, 1991) .

Kransow (2013) posited that ***building a sense of community*** in the online environment which requires interaction with each other – between student and instructor and among students was very important for production of learning satisfaction. He also pointed out that if students were satisfied with their online experiences, they will be more likely to remain in the program.

Sher (2009) also found that ***interaction between student and instructor and among students*** were significant in student satisfaction and learning.

In the study of Strachota (2003) concerning student satisfaction as a result of interaction between student and instructor, among students and with course content/ technology, it was found that ***learner-content interaction is most significant*** in yielding learning satisfaction , seconded by ***learner-instructor and learner-technology interaction*** (however interaction among students is found not significantly correlated with learning satisfaction.)

Drennan, Kenney and Pisarski (2005) also found positive perceptions of computer technology was related to learning satisfaction, followed by autonomous and innovative learning styles. These research results show that **tech efficacy and self-efficacy are both significant** in leading to learning satisfaction.

Richardson and Swan (2003) posited that ***social presence in online learning*** had great bearing to learning satisfaction.

Sahin (2007) found that the greatest predictor of student satisfaction is **personal relevance** (i.e. connection between students' personal experience with the course content, followed by **instructor support, active learning** and **real -life problem -solving**.

Kleinman (2005), in his ten years study, concluded that online environment that fostered **active, engaged learning** and which provided **interactive support** to help students to reach expectation will lead to learning satisfaction.

Swan (2001) also found **interactivity** was very important in the design of online teaching material for the uplift of students' satisfaction.

In the Constructivist theory of online learning (Chickering and Gamson (1987), it was found that **effective education was interactive** which facilitates students taking the lead in their own learning experience and facilitating active involvement.

It is considered by Bevis (1989) that **interactive teaching** engage learners in higher-order thinking (e. g. analysis, synthesis, and evaluation), which allows learners to assimilate, apply and retain learning. Knowles (1990) also theorizes that people are self-directed and prefer active learning strategies that involve interaction with others.

Zwirn (2005, p. 394) indicated that online interactive teaching strategies change the learning proves from passive to self-directed inquiry , with the **educator as a facilitator** instead of an authoritarian expert, and the approach from content-driven presentations to **shared inquiry** between the learners and educators that foster creativity and enhance collaborative learning. .

In the research study by Huang et al(2005), it was found that **virtual team learning** was significantly correlated with learning outcome.

However in the research study by Eom et al., 2006, there was **no finding of correlation between interaction and perceived learning outcomes** contrary to previous research (LaPointe & Gunawardena, 2004). It was explained by Eom et al. the reason might be because the study did not account for the quality or purpose of the interaction (i.e. without any personalization and customization of learning which could help the students to overcome the feeling of remoteness in online learning). Further, Eom et al. explained that well designed online system might reduce the need of interactions between instructor and students.

Learning satisfaction

Learner satisfaction has been **positively correlated with quality of learning outcome**. Abel (2005) contended that student satisfaction was one of the variables influencing the success of online learning programs, along with factors such as leadership, faculty commitment, student support and technology. Sener and Humbert (2003) argued that satisfaction was a vital part of a successful online program.

In short, literature review has shown a wide range of factors contributing to student satisfaction with online learning, including **clarity and relevance of assignments and communication, access to campus based resources, availability of technical support and orientation to the course, technology and equipment**. (Johnston et al. 2005).

In another study (Holli & Madill 2006, p.74), it was found that students who were **independent learners, persistent, organized in terms of time management and motivated** were good candidates for online learning, and appropriate preparation and support for both students and faculty members in online learning were required.

In the research by Chiu, et al. (2007), factors which contributed to learning satisfaction were found to be : **perceived fairness** of assessment, impact of personal cognition such as **self-efficacy, computer confidence and locus of control**.

In another survey of 295 learners from two Taiwanese universities, the most significant factors that contributed to learning satisfaction were found to be : **computer anxiety, e-learning course quality, perceived ease of use and diversity in assessment** (Sun et al, 2008)

Self-efficacy

In the research by Artino 2008, students' **self-efficacy** in an online learning environment was found a key contributor to overall satisfaction.

Palmer and Holt (2009) discovered that students' **comfort level with technology** was critical to satisfaction with online courses, followed by factors of clarity of expectations and students' **self-assessment** of how well they did in the online environment.

In a survey of 761 students from the Deakin University in Australia in 2006 (Palmer and Holt, 2009), it was found that the five items that yielded highest satisfaction in online learning format were (i) unit-related activities such as **assignment submission** and **access to digital resources**; (ii) having a **clear understanding of what was required** to succeed in the unit and receiving feedback on assignments online; (iii) how **confident** they felt about their ability to communicate and learn online (iv) how **well** they thought they were performing in the unit; and (v) **design and management strategies** for online learning environments.

All of the research results indicate that quality course structure, communication between teachers and students and among students, students' self- efficacy including computer efficacy are all very important factors leading to higher learning satisfaction.

Attention

In another study (M. Maqableh and M. Alia , 2021) to identify the problems faced by students shifting to online learning method, it was found that despite various positive aspects of online learning (including effectiveness of time and costs, safety, convenience and increased participation (Hussein, Daoud, Alrabaiah, & Badawi, 2020), a third of the surveyed students were dissatisfied with the online learning experience and the most important factors behind the students' dissatisfaction was a **distraction and reduced focus**, among other psychological , management and technological issues including internet connectivity and insufficient support from instructors and colleagues.

The elements leading to distraction and reduced focus included : **getting easily distracted; having to attend while doing other tasks; feeling less committed** due to the absence of the instructor's physical presence.

On the other hand, in the study by Perry (2006) , it was found that a unique online teaching strategy called "**photovoice**" – where visual images and accompanying stories were used as

participatory means of sharing expertise (Wang , C. & Burris, M. (1997) was effective in ***capturing students' attention, stimulate creative thinking and create community.***

Learning style

It is said learner's ***biological attributes*** such as multiple intelligence (Gardner, 1983) and ***personality characteristics*** (Myers & Briggs, 1995) such as attention, emotion, motivation and curiosity, and information processing (***learning***) ***styles*** such as logical analysis and psychological dimension (Dunn, Beaudry, & Klavas, 1989) are important part of a successful learning process. Eom, Ashill & Wen (2006) found that there was correlation between a learner's physiological learning style (visual and read/write style) and online pedagogical means.

In the study by Won & Kang (2015) about the student's acceptance of mobile learning and its impact on learning achievement, it was found that ***behavioral intention had a strong influence on learning achievement*** by means of learning satisfaction.

Hypothesis

By reason of the previous research results in relation to factors leading to positive learning outcome in online education (which were sometimes found inconsistent or were not adequately investigated) , it is the purpose of this research to test the validity of the following hypothesis:

H1a: **Interactivity** of online teaching has a positive bearing on students' **learning satisfaction.**

H1b: **Interactivity** of online teaching has a positive bearing on students' **learning outcome**

H2a: **Interactivity** of online teaching has a positive bearing on students' **self -efficacy.**

H2b: **Interactivity** of online teaching has a positive bearing on students' **attention** at online learning.

H3a: Students' **self-efficacy** has a positive bearing on their learning satisfaction.

H3b: Students' **self-efficacy** has a positive bearing on their learning outcome.

H4a: Students' **attention** at online learning has a positive bearing on their learning satisfaction.

H4b: Students' **attention** at online learning has a positive bearing on their learning outcome.

H5a: Students' **self-efficacy** has a positive bearing on student's **attention** at online learning.

H5b: Students' **attention** at online learning has a positive bearing on students' **self-efficacy**.

H6a: Students' **self-efficacy** has mediation effect between interactivity of teaching and learning satisfaction.

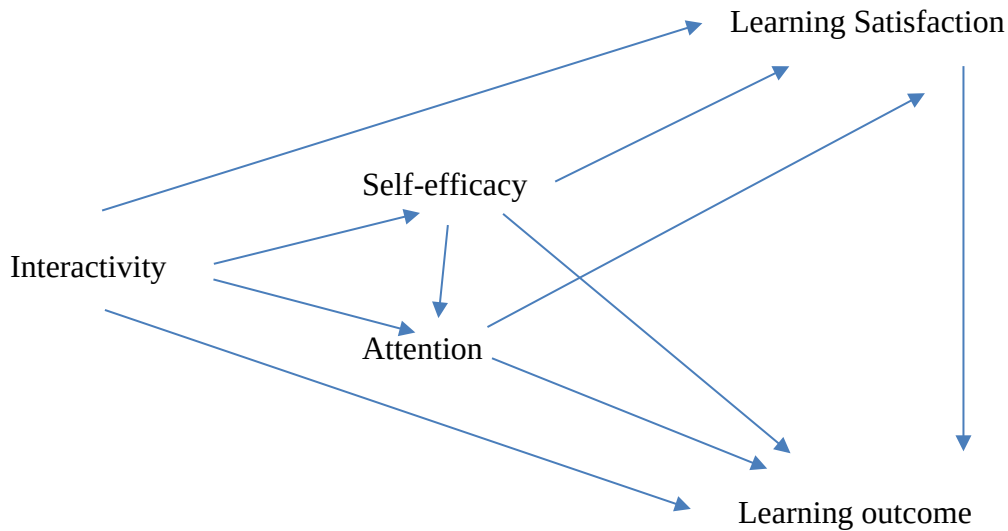
H6b. Students' **self-efficacy** has mediation effect between interactivity of teaching and learning outcome.

H7a: Students' **attention** has mediation effect between interactivity of teaching and learning satisfaction.

H7b: Students' **attention** has mediation effect between interactivity of teaching and learning outcome.

H8: Students' **learning satisfaction** has mediation effect between interactivity of teaching and learning outcome.

A summary chart of the relationship of the hypothesis are set out as follows:



Methodology

Sampling method / Sampling size

Due to the three independent variables of Interactivity, Self-efficacy and Attention, around 60 to 70 sampling units are targeted. Purposeful convenient sampling method is adopted. A survey by Questionnaire is conducted in the university of Science & Technology.

Sampling units

The requirement for the sampling units are students (male or female) having studied tertiary education with at least 3 months of online learning experience.

Since there are one independent variable and four dependent variables in the intended research, a sampling pool of around 60 to 70 students are targeted.

Sampling instrument - Questionnaire

A questionnaire of 78 questions were asked of the sampling units. The 78 questions are grouped under five main dimensions being **Interactivity, Self -efficacy, Attention, Learning satisfaction, Learning outcome**.

From the literature review, various sub-items are identified under each of the five main dimensions, and questions are set for the dimensions and sub-items in the Questionnaire accordingly.

Table 1. Nature of questions in relation to the five Dimensions and various sub-items

Question no.	Dimension	Sub-items
1-12	Interactivity of teaching	
	Self- efficacy	
13-20		Motivation
21-26		Self -regulation
27-31		Learning strategies
32-34		Adaptability
35-38		Technology efficacy
39-42a		Interaction of students
43-53	Attention	
54-65	Learning satisfaction	
	Learning outcome	
66-68		Cognitive understanding
69-70a		Interest
71-73		Value
74-76		Performance

Preparation of the Questionnaire

The questions are mainly chosen from some well-recognized Questionnaire being used in past literature research.

67 % of the questions (8 out of 12) on **Interactivity of teaching** are chosen from the items of interactivity in the Instructor's Perception of interaction in MOOCs (Massive Open online courses) (Khalil & Ebner, 2015) .

All of the questions on **Motivation** (Q . 13 – 20) were chosen from the Motivated Strategies for Learning Questionnaire (MSLQ) Manual (Pintrich, P.R., 1991).

Most questions (Q 21-24) on **Self- regulation** were chosen from the original McVay inventory frequently used in the questionnaire for distance learning (Bernard, Brauer , et al, 2004).

All questions on **Learning strategies** (Q 27-31) and on **Adaptability** (Q 32 to 34) are chosen from MSLQ Manual.

As for **Technology efficacy**, two questions (Q 35, 36) are chosen from McVay inventory of questions as adopted by Bernard, Brauer, et al (2004). One question (Q 37) is chosen from the Questionnaire items of Bernard et al., 2004. The last question in this regard (Q 38) is chosen from the OTSES (online technologies self-efficacy scale) questionnaire sample.

Some questions on **Interaction** (e.g. Q 39) are chosen from MSLQ or created/modified with reference to OTSES or MSLQ.

Similarly, all the 11 questions on **Attention** (Q 43- 53) are created or modified with reference to OTSES or MSLQ, with special bearing of the current online learning environment (note: This group of questions has enjoyed the highest Cronbach Alpha ultimately) .

For the questions on **Learning satisfaction** (Q 43- 65) , most of them are created or modified according to latest online learning environment .

Similarly, all the questions on the sub-items of **Learning outcome** (i.e. Cognitive understanding ,interest, value and performance) (Q 66 to 76) are created or modified according to latest online learning environment.

Pilot test

A sample pool of 12 persons (from age group of 28 to 35) were invited to fill in the draft proposed Questionnaire with 85 questions. Feedback was gathered from the participants and Cronbach Alpha was briefly run to test the consistency of the questions. An Average Cronbach alpha of around 0.3 to 0.5 was found for most sub-items. Peer review was further sought from friends who were engaged in the education sector for their comment before the current 78 questions are retained for the final Questionnaire (see Table 32 at the end of the Appendix) .

Sampling data processing

Sampling collection

The Questionnaire were sent out to the students at the canteen or library of the Science and Technology University on a particular day in December, 2021. In order to ensure the Questionnaire was duly completed, manuscript of the Questionnaire was used instead of digital format. A total of 67 students have responded. The students' consent to the use of their data for the purpose of this research was duly sought and confirmed before the data was used.

All the students' answers in the questionnaire were first entered into an Excel table. There are basically no missing answers (save and except for 11 missing data for the 'total academic courses attended' in the preamble of the Questionnaire).

Data analysis by SPSS

The SPSS (IBM version) with the extra 'PROCESS' function is to be used for the statistical analysis.

The sampling data are coded or reversely recoded, if they are asked in the negative form (as for questions 19,20,25, 26, 64, 65, 68). The answers to the sub-items are grouped under the **five main constructs/ dimensions**, resulting in the creation of two new categories – the “total efficacy” and “ total outcome” in the data set of the SPSS.

Demographic variables

The nationality of the students include that of Chinese HK, Chinese mainland and Malaysians. The degrees they are pursuing include that of BTGBM, COBGM, BBA, ACCT, LIFS, ISOM, ECOF, FINA/ISOM, SCI, BSC, MPHIL, BENG, MGMT, EE/AERO, MARK, FINA, CPEG, BIBU, ECON, QFIN or CEBGM.(Note: The full name of the abbreviated degrees are contained in Appendix table 1).

Descriptive statistics

After descriptive statistics are run for the attributes of the participants, it is found that 32 of the students (47.8 %) are male and 35 of them (52.2%) are female.

The age of the 67 participants range from 19 to 24, with the highest distribution at age 21 (26 %), then age 20 (23 %) and 19 (16.4%).

29 (43.3 %) of the students are studying in year four, 22 (32.8 %) of them are in year three and 14 (20.9 %) of them are in year two, with only 2 (3 %) being postgraduate students.

For the students’ total months of online experience, 13 of them (19.4 %) have 12 to 18 months online experience, and 54 of them (80.6 %) have 19 to 24 months of online experience.

A table of demographic variables is set out as follows (which can be also found in Appendix table 19):

Table 2. Demographic variables of participants (N=67)

Characteristics	<i>n</i>	%
Age group		
19-21	60	89.6
22-24	7	10.4
Gender		
Male	32	47.8
Female	35	52.2
Years		
2	14	20.9
3	22	32.8
4	29	43.3
PG1		
Online experience		
12-18 months	13	19.4
19-24 months	54	80.6
Total academic courses attended		
10-13	14	20.9
14-17	11	16.4
18-21	31	46.3

Note. 11 missing data in Total academic courses attended and the sum is 83.6%

Normality test

The normality of the main dimensions were checked under SPSS, with the aid of histogram and chart. (The histogram and chart for the normality of each dimension are set out in the Appendix table 17 and 18(a) to (e).

It is found that most data are normal in their distribution, except for a few outliers who are consistently shown to have done exceedingly well in most regards - exceling in self advocacy, attention, learning satisfaction and learning outcome. These few students may either be top students or unrealistic/irresponsible self-assessors. Yet, since the number is not too many and they may actually be honest cases, the outliers are not deleted from this research.

Reliability test

The Cronbach Alpha coefficient of the questions in the Questionnaire are tested for their consistency/reliability in the SPSS software under each main dimension (see Tables of Cronbach Alpha in the Appendix table 2-16) .

The Cronbach Alpha for the dimension of Interactivity (for question 1 to 12) is 0.492 (which is less than the desirable significant figure of 0.7).

The Cronbach Alpha for the dimension of Total efficacy (for questions 13 to 42a) is 0.472.

The Cronbach Alpha for the dimension of Attention (for questions 43 to 53) is 0.481.

The Cronbach Alpha for the dimension of Learning satisfaction (for questions 54 to 65) is 0.323.

The Cronbach alpha for the sub-item of ‘Cognitive understanding’ under the dimension of Learning outcome (questions 66 to 68) is originally 0.063. After deletion of question 67, the Cronbach alpha is brought up to 0.3532.

The Cronbach alpha for the sub-item of ‘Interest’ under the dimension of Learning outcome (questions 69 to 70a) is originally 0.209. After deletion of question 69, the Cronbach Alpha is brought up to 0.309.

The Cronbach alpha for the sub-item of ‘Value’ under the dimension of Learning outcome (questions 71 to 73) is originally 0.217. After deletion of question 73, the Cronbach Alpha is brought up to 0.305.

(Note: The Cronbach Alpha for the dimension of the total Learning outcome (for questions 66 to 76), even after deletion of questions 67, 69 and 73, is strangely of 0.118 only. However, it seems that this aberration in consistency for the total learning outcome has not affected the final statistical results which are largely consistent with various previous literature research).

It must also be noted that the Cronbach alpha for the questions chosen from the well- recognized Questionnaire samples are actually lower than the Cronbach alpha for questions specifically designed or modified for this research (e.g. in terms of Attention and Total Efficacy).

The reason for the low Cronbach alpha for the sample questions may be explained by the rapid change in the technological design and quality of the online education experienced by the students nowadays, particularly in the post Covid-19 era, as opposed to the experience of students one or two decades ago. Hence, the questions in the previous sample Questionnaire may not be so suitable for students' online experience nowadays.

The second reason for the low Cronbach alpha may be due to the artificial need to bring down the number of questions in the Questionnaire to save time and cost in the sampling collection and processing. In the original sample "Motivated strategies for Learning Questionnaire manual" (MSLQ), just around three construct of motivated strategies on motivation, self-efficacy and learning satisfaction), there are already 81 questions. In this research which involve five dimensions, proportionally speaking, there should be at least further 30 questions added to the original MSLQ. However, in order to restrict the scale of the questionnaire to save time and costs, only 78 questions are chosen or modified for the five main dimensions. The inadequate exploration of the issues in the Questionnaire may be one of the reason for the low Cronbach Alpha.

Results of statistical analysis

T-test for demographic variables

A T-test is run for the demographic variables to see if there is any significant differences caused to the two main dependent variables of the model (i.e. learning satisfaction and learning outcome) by reason of the demographic differences. The T-test of all demographic variables can be found in Appendix table 20-26.

The ANOVA result shows that there is only one demographic variable - i.e. **age group** which has a significant bearing to the prediction of the output of learning satisfaction.

Table 3. ANOVA result of Demographic variables on Learning Satisfaction & Learning outcome

Satisfaction

Characteristics	<i>df</i>	<i>F</i>	<i>p</i>
Age group	1,65	4.024	0.049
Gender	1,65	0.268	0.459
Years of study	3,63	0.305	0.822
Total course attended	2,53	0.991	0.378
Total online experience	1,65	0.009	0.925

Learning outcome

Characteristics			
Age group	1,65	0.112	0.739
Gender	1,65	0.231	0.69
Years of study	3,63	0.376	0.771
Total course attempted	2,53	0.507	0.605
Total online experience	1,65	0.028	0.868

Note. The sum of *df* of ‘total course attended’ is 53 (less than 66), due to the missing data

The age group variance may be explained by the differences in factors for learning satisfaction among different age groups.

Correlation test

The correlation among the five main dimensions of Interactivity, Self-efficacy, Attention, Learning satisfaction and Learning outcome are tested under SPSS .

Surprisingly, a **significant correlation** is found between Interactivity and all four other variables- Self-efficacy ($r=0.245$, $p<0.05$), Attention ($r=0.504$, $p<0.01$), Learning satisfaction($r=0.41$, $p<0.01$) and Learning outcome ($r=0.428$, $p<0.01$).

Self-efficacy is found significantly correlated with Attention ($r=0.393$, $p<0.01$) and learning outcome ($r=0.394$, $p <0.01$).

Attention is found significantly associated with Satisfaction ($r=0.556$, $p<0.01$) and Learning outcome ($r=0.331$, $p<0.01$) .

A summary table of the correlation co-efficient is set out below :

Table 4. Summary of correlation between the variables of Interactivity , Self- efficacy, Attention, Learning satisfaction and Learning outcome

Variable	Interactivit y	Self- efficacy	Attentio n	Satisfactio n	Learning outcome
Interactivity	1	0.245*	0.504**	0.41**	0.428**
Self-efficacy		1	0.393**	0.181	0.394**
Attention			1	0.556**	0.331**
Satisfaction				1	0.205
Learning outcome					1

Note: *p <0.05. **p <0.01.

(The table of correlation data between the five main dimensions and between each sub-item are contained in Appendix table 27 and 28).

Multi-linear Regression to test for mediation effect of variables

Three regression exercises are run under model 4 or model 6 in the PROCESS function of SPSS to find out the mediation effect of the variables of Self-efficacy, Attention and/or Learning Satisfaction in the relationship between Interactivity and Learning outcome.

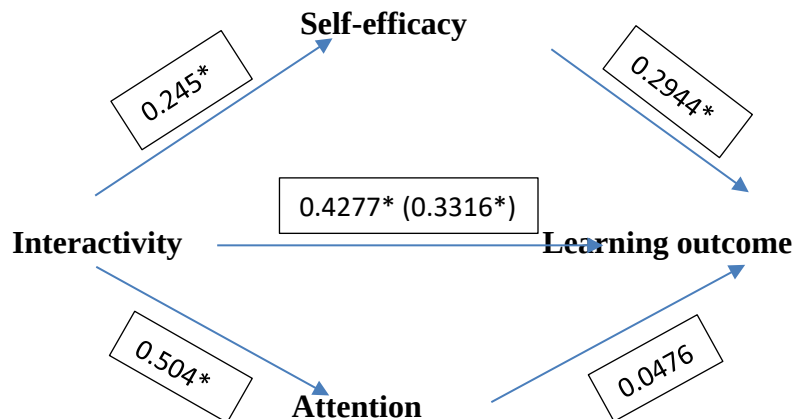
1st Regression analysis

In the first Regression analysis, several variables are investigated. Firstly, Interactivity is significantly associated with self-efficacy. Results indicate that Interactivity explains 6% variance of self-efficacy ($R^2 = 0.06$, $F(1,65) = 4.1521$, $p = 0.0457$). Furthermore, 25.4% of variance on Attention is explained by Interactivity ($R^2 = 0.254$, $F(1,65) = 22.133$, $p < 0.0001$). Also, higher Self-efficacy is associated with better learning outcome ($\beta = 0.2944$, $p = 0.0144$) but not associated with Attention at 0.05 significance ($\beta = 0.0476$, $p = 0.7182$) and the model was significant ($R^2 = 0.2737$, $F(3,63) = 7.9129$, $p = 0.0001$). The total effect of Interactivity on Learning

outcome is significant ($\beta = 0.4277$, $p = 0.003$). However, the effect of Interactivity is still significant after controlling Self-efficacy and Attention ($\beta = 0.3316$, $p = 0.0098$).

In order to test the mediation effect, bootstrapping is used and the indirect coefficient is not significant for Self-efficacy as the zero value lie between upper and lower confidence interval ($b = 0.0527$, 95%CI[-0.0353, 0.1626]) and also Attention ($b = 0.0175$, 95%CI[-0.0953, 0.1255]). Hence, there was **no mediation effect** of Self -efficacy and Attention upon the variables of Interactivity and Learning outcome. (The process matrix can be found in Appendix table 29).

A summary chart of the findings of the first regression exercise is set out as follows:

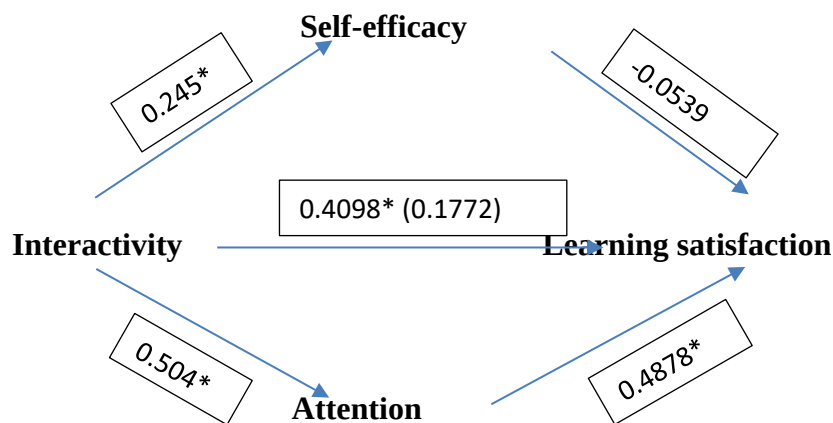


2nd Regression analysis

In the second regression exercise, the mediation effect of the variables of Self -efficacy and Attention are tested in the relationship between the independent variable of Interactivity and the dependent variable of Learning satisfaction. Results indicate that interactivity explains 6% variance of self-efficacy ($R^2 = 0.06$, $F(1,65) = 4.1521$, $p = 0.0457$). Furthermore, 25.4% of variance on Attention is explained by interactivity ($R^2 = 0.254$, $F(1,65) = 22.133$, $p < 0.0001$). The multilinear regression model of Learning satisfaction is also significant ($R^2 = 0.334$, $F(3,63) = 10.5314$, $p < 0.0001$). In this model, only Attention significantly predicts Learning satisfaction ($\beta = 0.4878$, $p = 0.0003$) but not Self-efficacy ($\beta = -0.0539$, $p = 0.6321$) and neither Interactivity ($\beta = 0.1772$, $p = 0.1424$).

However, the total effect of Interactivity on Learning satisfaction was significant ($\beta=0.4098$, $p=0.006$). This indicates the possibility of mediation effect. In the bootstrapping mediation analysis, the indirect coefficient is significant ($b=0.2051$, 95%CI[0.0352, 0.3712]). There is therefore clearly **mediation effect** of the variables of Self-efficacy and Attention upon the relationship **between interactivity and Learning Satisfaction**. The process matrix can be found in appendix table 30.

A summary chart of the findings of the second regression exercise is set out as follows:



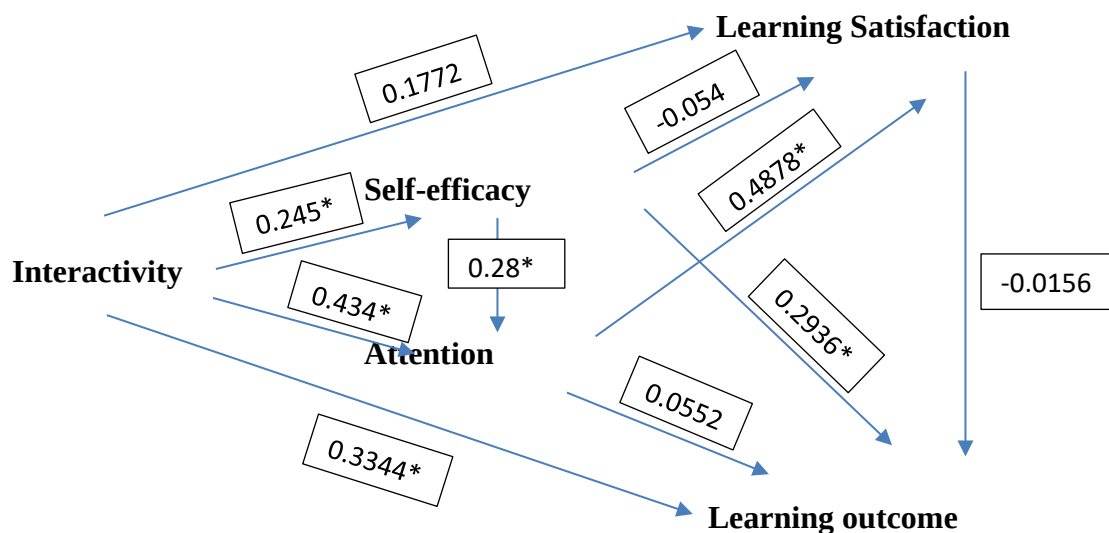
3rd Regression exercise

In the third regression exercise, all the three variables Self-efficacy, Attention and Learning satisfaction are tested (under model 6 of the PROCESS function in SPSS) for their mediation effect upon the relationship between the independent variable of Interactivity and the dependent variable of Learning outcome. Firstly, results indicated that interactivity explains 6% variance of self-efficacy ($R^2=0.06$, $F(1,65)=4.1521$, $p=0.0457$). 33.1% variance of attention is explained by Interactivity and Self-efficacy ($R^2=0.331$, $F(2,64)=15.864$, $p<0.0001$) and they both positively predict attention ($\beta=0.434$, $p=0.0001$ and $\beta=0.287$, $p=0.008$). Furthermore, 33.4% variance of Learning satisfaction is explained by Interactivity, Self-efficacy and Attention ($R^2=0.334$, $F(3,63)=10.5314$, $p<0.0001$).

However, only Attention is positively associated with Learning satisfaction ($\beta=0.4878$, $p=0.0003$). The final regression model is also significant ($R^2=0.2738$, $F(4,62)=5.8453$, $p=0.0005$). In this model, the only Interactivity ($\beta=0.3344$, $p=0.0111$) and Self-efficacy ($\beta=0.2936$, $p=0.0157$) are associated with learning outcome but not Attention ($\beta=0.0552$, $p=0.7091$) and neither Self-satisfaction ($\beta=-0.0156$, $p=0.9068$).

From the above information, it is seemingly possible that self-efficacy mediates the relationship between learning outcome and interactivity. However, the indirect coefficient is not significant ($b=0.0526$, $95\%CI[-0.0361, 0.1636]$). Therefore, there is no indication of mediation effect of self-efficacy in the relationship between interactivity and learning outcome. The process matrix can be found in appendix table 31.

A summary chart of the findings of the third regression exercise is set out as follows:



The data showing the mediation effect of the three variables of Self-efficacy, Attention and Learning Satisfaction upon the relationship of Interactivity and Learning outcome are summarized as follows:

Interactivity→Self-efficacy→L outcome	b=0.0526, 95% CI[-0.0365,0.1589]
Interactivity→Attention→L outcome	b=0.0175,95 % CI [-0.0957,0.1097]
Interactivity→L satisfaction→L outcome	b =-0.002, 95 % CI [-0.0337,0.0387]
Interactivity→Self-efficacy→Attention→L outcome	b =0.0028, 95 % CI [-0.0156,0.03]
Interactivity→Self-efficacy→L satisfaction →L outcome	b = 0.0002, 95 % CI [-0.0056,0.0074]
Interactivity→Attention→L Satisfaction→ L outcome	b = -0.0024, 95% CI [-0.0042,0.0393]
Interactivity→Self-efficacy→Attention→ L Satisfaction→L outcome	b = -0.0004, 95 % CI [-0.0099, 0.0068]

Looking at the b and 95 % CI figures in any of the 7 paths indicated above, it is concluded there is **no mediation effect** of the three variables of Self-efficacy, Attention and Learning Satisfaction in the relationship between Interactivity and Learning outcome.

However, from the multilinear regression exercise, it can be confirmed that there is **significant correlation** between the following variables :

Interactivity↔ Self-efficacy ↔L outcome.	
Interactivity↔ Attention ↔L outcome	
Interactivity ↔ Attention ↔L Satisfaction	
Interactivity ↔ Self-efficacy ↔ Attention ↔ L Satisfaction	

Discussions of findings and implication

Findings on validity of Hypothesis

By reason of the statistical analysis explained above, it can be concluded that:

Hypothesis 1a and 1b are supported- i.e. Interactivity of online teaching has a positive bearing on students' learning satisfaction and learning outcome.

Hypothesis 2a and 2b are also supported, i.e. interactivity of online teaching has a possible bearing on students' self – efficacy and attention.

Hypothesis 3a is not supported- i.e. students' self-efficacy has no significant bearing on learning satisfaction.

Hypothesis 3b is supported- i.e. students' self- efficacy has significant bearing on their learning outcome.

Hypothesis 4a is supported -i.e. students' attention at online - learning has a positive bearing on their learning satisfaction.

However, Hypothesis 4b is not supported -i.e. students' attention at online - learning is found to have no significant bearing on their learning outcome.

Hypothesis 5a is supported – i.e. students' self-efficacy has a positive bearing on student's attention at online learning.

Hypothesis 5b is supported - i.e. there is evidence to show that students' attention has positive bearing on students' self -efficacy.

Hypothesis 6a is not supported_– i.e. there is no mediation effect of self -efficacy between interactivity of teaching and learning satisfaction.

However, Hypothesis 6b is not supported – i.e. there is no mediation effect of self-efficacy between interactivity of teaching and learning outcome.

Hypothesis 7a is supported – i.e. there is mediation effect of attention between interactivity of teaching and learning satisfaction.

However, Hypothesis 7 b is not supported- there is no mediation effect of attention between interactivity of teaching and learning satisfaction.

Hypothesis 8 is **not** supported -i.e. there is no significant mediation effect of students' learning satisfaction between interactivity of teaching and learning outcome

Implication of analysis

The **strong correlation** found between **Interactivity and Self -efficacy, Attention, Learning satisfaction and Learning outcome** is very encouraging indeed. It is consistent with most of the previous literature review (Artino & McCoach, 2008; O et.al.,2010; Puzziferro, 2008) .

The statistical result indicates that **interactivity** of teaching activities is a very important factor in affecting learning attention, satisfaction and outcome, and should therefore be given the highest priority and attention in the design of course structure, content and online delivery by educators.

The significant by variate correlation found between **Attention , Learning Satisfaction and Learning outcome** is a pleasing *new finding* indicating the importance of raising the attention and interest level of students in online courses.

The absence of significant correlation between Self- efficacy and Learning satisfaction is understandable, as cognitive, psychological and technological efficacy of a student do not necessarily give rise to higher learning satisfaction, in the absence of other additional stimulating, rewarding or interest-arousing factors.

The **strong correlation between Self -efficacy and Learning outcome** is highly consistent with previous literature research, and can easily be explained by the efficacy factors such as good time management, good learning strategies, self -confidence/motivation, good computer operational skill and accessibility.

Hence, another important implication from this research is that **students' self-efficacy** should be enhanced (i.e. they should be encouraged to be more disciplined, motivated, skillful and adaptative) to meet the challenges of online education.

The extent, content and quality of students' self- efficacy which predicts good learning outcome have to be recognized by educators and taught of the students in a practical way to *enhance their*

motivation, confidence, operational skill, self-management and self-initiated interaction with teachers and fellow classmates.

Another exciting discovery from this research is the confirmation of a **significant mediation effect of Attention upon the relationship of Interactivity and learning satisfaction**. This finding informs us that a right quantity and quality of attention in an online learning process is a **game-changing factor** to enhance the students' sense of satisfaction with the online course. With the learning satisfaction raised, the students will be more motivated and committed to receive online learning and thus lead to a high retention rate which is conducive to the survival and innovation concerning the design of online educational courses.

Significance and value of this research

This research has jumped on the wagon of investigation for the purpose of developing and enhancing online education in Hong Kong. This research attempt is a response to meet the new challenge thrown by the Covid-19 pandemic and is also a response to the growing call for more equity and quality of educational experience for all University students nowadays.

The confirmation of strong correlation among all the variables of Interactivity of teaching, Learning attention, Self-efficacy (including motivation, confidence, learning strategies and technological efficacy), Learning satisfaction and Learning outcome has informed us that it is most worthwhile for educators to invest in the development of **innovative interactivity** of teaching elements, both in terms of the course structure, course content and pedagogical method and manner.

From the result of this research, educators should be reminded of the importance of **creation of person-to-person communication (albeit online) between instructor and students** as much as possible. The Achilles heels of online education – i.e. inadequacy of interaction between instructor and students, can be largely mended by a **strong social presence of the instructor** at the online course, with clear guidance and explanation of study expectation and study goal, timely technological support to increase students' efficacy in online accessibility and operation,

active prompting and encouragement of students to express and ask questions in online class , engagement of more real-time teaching , adoption of more interactive teaching content (e.g. rewarding quiz and peers' comment) , availing updated multimedia technology to raise the interest and attention of class attendance, ensuring prompt and meaningful feedback from instructor, etc. - all to help alleviating the lack of actual physical interaction in online education between instructor and students, and to raise the class attention, learning satisfaction and ultimately the learning outcome .

The result of this research will also inform educators to pay attention to the **development of self-efficacy** of the students for online learning, so that they may be more equipped to benefit from this pedagogical means which is growing inevitably in popularity, necessity and importance nowadays .

The aspects of self- efficacy is not just around **technological efficacy** in using computer and online facilities (although they are no doubt very important too). **Psychological efficacy** such as self confidence in trying new means of learning, willingness to get more disciplined and self-regulated in learning strategies, courage to express online, interest to participate in a peer group culture with emphasis on mutual learning and assistance, will all significantly help to raise the learning satisfaction and the final learning outcome.

This research result will also inform educators that the significance and effect of '**attention**' upon learning satisfaction and learning outcome cannot be ignored. **Innovative means** (e.g. the Photovoice or even AI virtual technologies) should be adopted to increase the interest and attention of students in online learning, which will in turn lead to significant increase in learning satisfaction and learning outcome. Basic available instrument such as webcams should be engaged more to ensure visual contact and observation of facial expression during online communication. Encouraging remarks should be used more by instructors (during class and in assignment feedback) to boost students' interest and confidence in online learning.

As this world grow rapidly in the digital virtual technology, and travelling is seemingly getting more and more frustrated by the pandemic, time and cost issues, online pedagogical means will likely become a mainstream development in the near future. This research is a good academic

attempt to really educators' attention, trust and faith in the development of online education with the enhancement of interactivity in the design and delivery of the educational courses.

Limitation and future research interest

The relatively ***small sampling pool*** (merely 67 students) for five main dimensions in this research is potentially a risk and limitation in the applicability of the statistical result to the generic situation in HK or worldwide.

The ***differences in online experience of the sampling units*** may produce inconsistent results frustrating the accuracy of predication of the impact of the various variables in the equation.

The ***restriction to previous well-established questionnaire items*** may be a hindrance to an updated research into the contemporary psychological, technological and social online situation.

In order to identify ***which kind of interactivity*** in the teaching construct is most effective in arousing interest, self -efficacy, attention and learning satisfaction of the students, further in-depth exploratory research should be carried out by those concerned.

The investigation into the ***feasibility of AI virtual technology*** to enhance interactivity significantly should also be promptly explored before the educator sector is overtaken and left behind by the meta world technology.

- The end -

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APPENDIX

Table 1 Abbreviation for names of degrees

ACCT	Accounting
BIBU	Biotechnology and business
BIOT	Biotechnology
BTGBM	Biotechnology and business
CEBGM	Chemical science and business
CENG	chemical engineering
COGBM	Computer science and business
CPEG	computer engineering
CS	computer science
ECOF	economics and finance
ECON	economics
EE	electronic engineering
EE/AERO	electronic engineering/ aerospace engineering
FINA	finance
FINA/ ISOM	finance/ information system
ISOM	information system & operation management
LIFS	life science
MARK	marketing
MARK/ FINA	marketing/ finance
MGMT	management
PHYS	physics
PHYS MPHIL	physics
QFIN	Quantitative finance

Table 2. Cronbach Alpha for questions 1-12

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.492	.491	12

Inter-Item Correlation Matrix												
	The online platform for teaching is user-friendly.	@2	@3	@4	@5	@6	@7	@8	@9	@10	@11	@12
The online platform for teaching is user-friendly.	1.000	-.028	.065	.154	-.070	-.085	.049	-.063	.293	.228	.025	.202
@2	-.028	1.000	-.028	-.003	.290	.091	.197	.107	.154	-.264	.126	.172
@3	.065	-.028	1.000	.123	.151	.023	.199	-.088	-.013	.015	.015	.136
@4	.154	-.003	.123	1.000	-.068	.144	-.006	.019	.125	.030	-.202	.085
@5	-.070	.290	.151	-.068	1.000	.222	.271	.119	.313	-.019	-.099	.262
@6	-.085	.091	.023	.144	.222	1.000	.146	.164	-.120	-.028	-.092	-.084
@7	.049	.197	.199	-.006	.271	.146	1.000	.085	.041	.115	.171	.206

@8	-.063	.107	-.088	.019	.119	.164	.085	1.00 0	.001	.191	-.067	.085
@9	.293	.154	-.013	.125	.313	-.120	.041	.001	1.00 0	-.016	.061	.254
@10	.228	-.264	.015	.030	-.019	-.028	.115	.191	-.016	1.00 0	.138	.049
@11	.025	.126	.015	-.202	-.099	-.092	.171	-.067	.061	.138	1.00 0	.250
@12	.202	.172	.136	.085	.262	-.084	.206	.085	.254	.049	.250	1.00 0

Table 3. Cronbach alpha for questions 13-20

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.300	.309	8

Inter-Item Correlation Matrix								
	@13	@14	@15	@16	@17	@18	@19	@20
@13	1.000	-.196	-.077	.085	.020	.271	.051	.021
@14	-.196	1.000	.037	.100	.193	-.016	-.093	.053
@15	-.077	.037	1.000	-.079	.104	.086	.273	.119
@16	.085	.100	-.079	1.000	.012	.156	.052	.052
@17	.020	.193	.104	.012	1.000	.103	-.039	.132
@18	.271	-.016	.086	.156	.103	1.000	-.092	.047
@19	.051	-.093	.273	.052	-.039	-.092	1.000	.106
@20	.021	.053	.119	.052	.132	.047	.106	1.000

Table 4. Cronbach alpha for questions 21-26

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.099	.040	6

Inter-Item Correlation Matrix						
	@21	@22	@23	@24	@25	@26
@21	1.000	.002	.232	-.233	-.240	-.134
@22	.002	1.000	.017	.203	-.089	.081
@23	.232	.017	1.000	.150	-.086	.081
@24	-.233	.203	.150	1.000	.022	-.095
@25	-.240	-.089	-.086	.022	1.000	.195
@26	-.134	.081	.081	-.095	.195	1.000

Table 5. Cronbach alpha for questions 27-31

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.082	.069	5

Inter-Item Correlation Matrix					
	@27	@28	@29	@30	@31
@27	1.000	-.053	-.074	.098	.143
@28	-.053	1.000	.081	-.067	-.215

@29	-.074	.081	1.000	.102	.127
@30	.098	-.067	.102	1.000	.005
@31	.143	-.215	.127	.005	1.000

Table 6. Cronbach alpha for questions 32-34

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.458	.451	3

Inter-Item Correlation Matrix			
	@32	@33	@34
@32	1.000	.141	.021
@33	.141	1.000	.483
@34	.021	.483	1.000

Table 7. Cronbach alpha for questions 35-38

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.486	.492	4

Inter-Item Correlation Matrix

	@35	@36	@37	@38
@35	1.000	.126	.289	.111
@36	.126	1.000	.344	.132
@37	.289	.344	1.000	.168
@38	.111	.132	.168	1.000

Table. 8 Cronbach alpha for questions 39-42a

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.045	.038	5

Inter-Item Correlation Matrix

	@39	@40	@41	@42	@42a
@39	1.000	.026	.082	.027	.007
@40	.026	1.000	.146	-.038	-.005
@41	.082	.146	1.000	.005	-.157
@42	.027	-.038	.005	1.000	-.016
@42a	.007	-.005	-.157	-.016	1.000

Table. 9 Cronbach alpha for questions 43- 53

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.481	.494	11

Inter-Item Covariance Matrix									
	@43	@44	@45	@46	@47	@48	@49	@50	@51
@43	2.585	.911	.022	.439	.251	.760	.955	.037	.130
@44	.911	2.454	.140	.270	.063	.093	.991	.009	.499
@45	.022	.140	2.004	.366	.066	.440	-.278	-.048	.146
@46	.439	.270	.366	1.456	.585	.632	.163	-.174	.229
@47	.251	.063	.066	.585	2.234	.585	.255	-.347	.472
@48	.760	.093	.440	.632	.585	2.219	.449	-.059	.028
@49	.955	.991	-.278	.163	.255	.449	4.553	.620	.285
@50	.037	.009	-.048	-.174	-.347	-.059	.620	2.673	-.258
@51	.130	.499	.146	.229	.472	.028	.285	-.258	1.011
@52	.328	.005	-.223	-.002	.409	.038	-.254	.150	.235
@53	-.442	-.032	.424	-.283	-.070	-.204	-.282	-.198	.275

Table. 10 Cronbach alpha for questions 54 – 65

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items

.323	.285	12
------	------	----

Inter-Item Correlation Matrix

	@54	@55	@56	@57	@58	@59	@60	@61	@62	@63	@64	@65
@54	1.000	-.065	.157	-.016	-.066	.051	.145	.051	.069	.137	.004	-.156
@55	-.065	1.000	.184	.119	.161	-.206	.158	.321	-.108	.125	-.150	.189
@56	.157	.184	1.000	.164	-.020	-.193	.068	.234	.089	.131	.064	.211
@57	-.016	.119	.164	1.000	-.010	-.240	-.014	.040	.213	.033	-.091	.192
@58	-.066	.161	-.020	-.010	1.000	.026	.009	-.005	.214	-.222	-.058	.055
@59	.051	-.206	-.193	-.240	.026	1.000	.172	.005	-.100	.219	-.230	-.210
@60	.145	.158	.068	-.014	.009	.172	1.000	.248	.005	.252	-.263	.111
@61	.051	.321	.234	.040	-.005	.005	.248	1.000	-.222	.278	.042	.182
@62	.069	-.108	.089	.213	.214	-.100	.005	-.222	1.000	-.095	-.005	-.094
@63	.137	.125	.131	.033	-.222	.219	.252	.278	-.095	1.000	-.121	-.084
@64	.004	-.150	.064	-.091	-.058	-.230	-.263	.042	-.005	-.121	1.000	.038
@65	-.156	.189	.211	.192	.055	-.210	.111	.182	-.094	-.084	.038	1.000

Table. 11 Cronbach alpha for questions 66 – 68

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items ^a	N of Items
.063	-.042	3

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Inter-Item Correlation Matrix

	@66	@67	@68
@66	1.000	-.141	.217
@67	-.141	1.000	-.117
@68	.217	-.117	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
@66	8.49	3.011	.123	.061	-.226 ^a
@67	8.61	5.150	-.163	.028	.352
@68	8.39	2.241	.119	.055	-.305 ^a

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Table. 12 Cronbach alpha for q 69-70a

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.209	.213	3

Inter-Item Correlation Matrix

	@69	@70	@70a
@69	1.000	-.063	.128
@70	-.063	1.000	.184
@70a	.128	.184	1.000

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
@69	7.72	3.661	.050	.024	.309
@70	8.15	4.341	.073	.042	.225
@70a	8.10	3.246	.222	.054	-.132 ^a

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Table. 13 Cronbach alpha for questions 71-73

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.217	.214	3

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
@71	8.91	2.992	.170	.036	.022
@72	9.67	3.012	.134	.032	.109
@73	8.79	3.622	.045	.003	.305

Table. 14. Cronbach alpha for questions 74-76

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.312	.311	3

Inter-Item Correlation Matrix

	@74	@75	@76
@74	1.000	.114	.130
@75	.114	1.000	.149
@76	.130	.149	1.000

Table 15. Cronbach alpha for question 66-76 after deletion of questions 67, 69 and 73 that reduce Cronbach alpha

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.118	.109	9

Inter-Item Correlation Matrix

	@66	@68	@70	@70a	@71	@72	@74	@75	@76	@67	@69	@73
@66	1.000	.217	-.111	-.052	.197	.116	-.111	-.032	-.056	-.141	.003	-.159
@68	.217	1.000	-.066	.014	-.021	-.048	.292	-.124	.035	-.117	.089	.094
@70	-.111	-.066	1.000	.184	.124	-.122	-.104	-.054	.210	-.022	-.063	.009
@70a	-.052	.014	.184	1.000	.030	-.099	-.193	-.097	.056	.038	.128	.090

@71	.197	-.021	.124	.030	1.000	.180	-.007	-.202	-.121	-.095	-.137	.058
@72	.116	-.048	-.122	-.099	.180	1.000	.166	-.001	-.106	.168	.023	.011
@74	-.111	.292	-.104	-.193	-.007	.166	1.000	.114	.130	.072	.099	.030
@75	-.032	-.124	-.054	-.097	-.202	-.001	.114	1.000	.149	-.107	-.030	-.212
@76	-.056	.035	.210	.056	-.121	-.106	.130	.149	1.000	.026	-.183	.157
@67	-.141	-.117	-.022	.038	-.095	.168	.072	-.107	.026	1.000	.007	-.099
@69	.003	.089	-.063	.128	-.137	.023	.099	-.030	-.183	.007	1.000	.035
@73	-.159	.094	.009	.090	.058	.011	.030	-.212	.157	-.099	.035	1.000

Table 16. Cronbach alpha of the main dimension of Self- efficacy (named as ‘totalefficacy’ in the SPSS software (including all the sub-items)

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.472	.486	31

Inter-Item Correlation Matrix								
	@13	@14	@15	@16	@17	@18	@19	@20
@13	1.000	-.196	-.077	.085	.020	.271	.051	.021
@14	-.196	1.000	.037	.100	.193	-.016	-.093	.053
@15	-.077	.037	1.000	-.079	.104	.086	.273	.119
@16	.085	.100	-.079	1.000	.012	.156	.052	.052
@17	.020	.193	.104	.012	1.000	.103	-.039	.132
@18	.271	-.016	.086	.156	.103	1.000	-.092	.047
@19	.051	-.093	.273	.052	-.039	-.092	1.000	.106
@20	.021	.053	.119	.052	.132	.047	.106	1.000
@21	.303	.070	.292	.049	-.028	.014	.055	-.088
@22	.177	-.058	.236	.022	.082	.211	.228	-.009
@23	-.149	.228	.428	.082	.136	.198	.132	.009
@24	-.238	.280	-.012	-.002	.004	.051	-.102	.003

@25	-.201	-.093	-.219	-.289	-.184	-.146	-.006	.168
@26	.003	-.253	-.081	-.182	-.195	.133	.139	-.051
@27	.118	.130	.102	.037	.067	.088	.190	.187
@28	.041	.132	.061	.073	.073	.033	.043	.279
@29	.011	-.150	.131	-.084	.147	-.115	.072	.063
@30	.087	-.040	-.175	-.037	.157	.107	-.075	-.053
@31	.026	.125	-.038	.020	-.294	-.066	-.049	.005
@32	.230	.032	.328	.131	-.081	.018	.134	-.095
@33	-.050	-.127	.118	-.102	.280	-.090	.009	.185
@34	.018	-.039	.131	-.070	.215	.043	.027	.105
@35	.057	.084	.113	-.042	.075	-.056	.256	.143
@36	-.151	.025	.035	-.034	.359	-.188	-.099	.220
@37	-.035	.093	-.014	.062	.212	-.093	.291	.228
@38	.027	.088	.040	.081	-.120	-.042	-.103	-.114
@39	.050	-.174	-.076	.013	.151	.144	.062	-.193
@40	-.081	-.268	.108	.150	-.037	-.046	.026	.036
@41	.113	-.094	.025	-.136	-.027	.207	-.222	.200
@42	-.409	.338	-.043	.126	.010	-.027	.019	.168
@42a	-.033	.076	.027	-.025	.021	.010	-.043	-.198

Inter-Item Correlation Matrix

	@21	@22	@23	@24	@25	@26	@27	@28
@13	.303	.177	-.149	-.238	-.201	.003	.118	.041
@14	.070	-.058	.228	.280	-.093	-.253	.130	.132
@15	.292	.236	.428	-.012	-.219	-.081	.102	.061
@16	.049	.022	.082	-.002	-.289	-.182	.037	.073
@17	-.028	.082	.136	.004	-.184	-.195	.067	.073
@18	.014	.211	.198	.051	-.146	.133	.088	.033
@19	.055	.228	.132	-.102	-.006	.139	.190	.043
@20	-.088	-.009	.009	.003	.168	-.051	.187	.279
@21	1.000	.002	.232	-.233	-.240	-.134	-.215	-.064
@22	.002	1.000	.017	.203	-.089	.081	.009	.061
@23	.232	.017	1.000	.150	-.086	.081	.085	.200
@24	-.233	.203	.150	1.000	.022	-.095	.059	.127
@25	-.240	-.089	-.086	.022	1.000	.195	-.145	.128
@26	-.134	.081	.081	-.095	.195	1.000	-.096	-.007
@27	-.215	.009	.085	.059	-.145	-.096	1.000	-.053

@28	-.064	.061	.200	.127	.128	-.007	-.053	1.000
@29	.147	.137	-.091	.141	-.010	-.125	-.074	.081
@30	.061	.058	.027	-.067	.215	.017	.098	-.067
@31	.007	.164	-.189	.182	-.040	.055	.143	-.215
@32	.240	.120	.178	.027	-.254	-.181	.108	.128
@33	.057	.056	-.029	-.010	-.069	-.192	.086	.075
@34	.113	-.020	.060	.069	-.135	-.211	.091	-.028
@35	.021	.226	-.051	.155	.013	.194	.030	-.080
@36	-.274	-.157	-.069	.079	-.131	-.070	.032	.057
@37	-.139	-.042	.021	-.076	.099	.136	.212	.139
@38	.041	-.282	.109	.293	-.217	-.077	.200	-.112
@39	-.052	.002	.089	-.154	-.077	.192	-.030	-.115
@40	.165	.105	.135	.182	-.070	.039	-.095	-.130
@41	-.007	-.029	-.054	-.044	.110	.063	-.044	-.043
@42	-.122	-.166	.141	.319	.142	-.266	.106	-.034
@42a	.138	-.041	.159	.050	.089	.129	-.231	.048

Inter-Item Correlation Matrix

	@29	@30	@31	@32	@33	@34	@35	@36
@13	.011	.087	.026	.230	-.050	.018	.057	-.151
@14	-.150	-.040	.125	.032	-.127	-.039	.084	.025
@15	.131	-.175	-.038	.328	.118	.131	.113	.035
@16	-.084	-.037	.020	.131	-.102	-.070	-.042	-.034
@17	.147	.157	-.294	-.081	.280	.215	.075	.359
@18	-.115	.107	-.066	.018	-.090	.043	-.056	-.188
@19	.072	-.075	-.049	.134	.009	.027	.256	-.099
@20	.063	-.053	.005	-.095	.185	.105	.143	.220
@21	.147	.061	.007	.240	.057	.113	.021	-.274
@22	.137	.058	.164	.120	.056	-.020	.226	-.157
@23	-.091	.027	-.189	.178	-.029	.060	-.051	-.069
@24	.141	-.067	.182	.027	-.010	.069	.155	.079
@25	-.010	.215	-.040	-.254	-.069	-.135	.013	-.131
@26	-.125	.017	.055	-.181	-.192	-.211	.194	-.070
@27	-.074	.098	.143	.108	.086	.091	.030	.032

@28	.081	-.067	-.215	.128	.075	-.028	-.080	.057
@29	1.000	.102	.127	.091	.063	.166	.173	.054
@30	.102	1.000	.005	-.176	.240	.221	.291	-.056
@31	.127	.005	1.000	-.028	-.023	-.033	.173	-.119
@32	.091	-.176	-.028	1.000	.141	.021	.048	.029
@33	.063	.240	-.023	.141	1.000	.483	.172	.310
@34	.166	.221	-.033	.021	.483	1.000	.170	.192
@35	.173	.291	.173	.048	.172	.170	1.000	.126
@36	.054	-.056	-.119	.029	.310	.192	.126	1.000
@37	.183	.053	-.141	.145	.064	.035	.289	.344
@38	-.081	-.179	.080	.329	.128	.173	.111	.132
@39	-.130	.065	-.210	-.150	-.204	.023	.053	-.002
@40	.176	-.010	.016	-.226	-.072	-.076	.078	-.087
@41	.092	-.097	-.089	-.062	-.088	-.071	-.067	-.010
@42	.080	.169	-.059	-.100	.098	.313	.146	.151
@42a	.091	.078	-.005	.057	.212	.142	.002	.117

Inter-Item Correlation Matrix

	@37	@38	@39	@40	@41	@42	@42a
@13	-.035	.027	.050	-.081	.113	-.409	-.033
@14	.093	.088	-.174	-.268	-.094	.338	.076
@15	-.014	.040	-.076	.108	.025	-.043	.027
@16	.062	.081	.013	.150	-.136	.126	-.025
@17	.212	-.120	.151	-.037	-.027	.010	.021
@18	-.093	-.042	.144	-.046	.207	-.027	.010
@19	.291	-.103	.062	.026	-.222	.019	-.043
@20	.228	-.114	-.193	.036	.200	.168	-.198
@21	-.139	.041	-.052	.165	-.007	-.122	.138
@22	-.042	-.282	.002	.105	-.029	-.166	-.041
@23	.021	.109	.089	.135	-.054	.141	.159
@24	-.076	.293	-.154	.182	-.044	.319	.050
@25	.099	-.217	-.077	-.070	.110	.142	.089
@26	.136	-.077	.192	.039	.063	-.266	.129
@27	.212	.200	-.030	-.095	-.044	.106	-.231
@28	.139	-.112	-.115	-.130	-.043	-.034	.048
@29	.183	-.081	-.130	.176	.092	.080	.091
@30	.053	-.179	.065	-.010	-.097	.169	.078

@31	-.141	.080	-.210	.016	-.089	-.059	-.005
@32	.145	.329	-.150	-.226	-.062	-.100	.057
@33	.064	.128	-.204	-.072	-.088	.098	.212
@34	.035	.173	.023	-.076	-.071	.313	.142
@35	.289	.111	.053	.078	-.067	.146	.002
@36	.344	.132	-.002	-.087	-.010	.151	.117
@37	1.000	.168	-.036	-.198	-.284	.096	.156
@38	.168	1.000	-.091	.048	.008	.125	-.019
@39	-.036	-.091	1.000	.026	.082	.027	.007
@40	-.198	.048	.026	1.000	.146	-.038	-.005
@41	-.284	.008	.082	.146	1.000	.005	-.157
@42	.096	.125	.027	-.038	.005	1.000	-.016
@42a	.156	-.019	.007	-.005	-.157	-.016	1.000

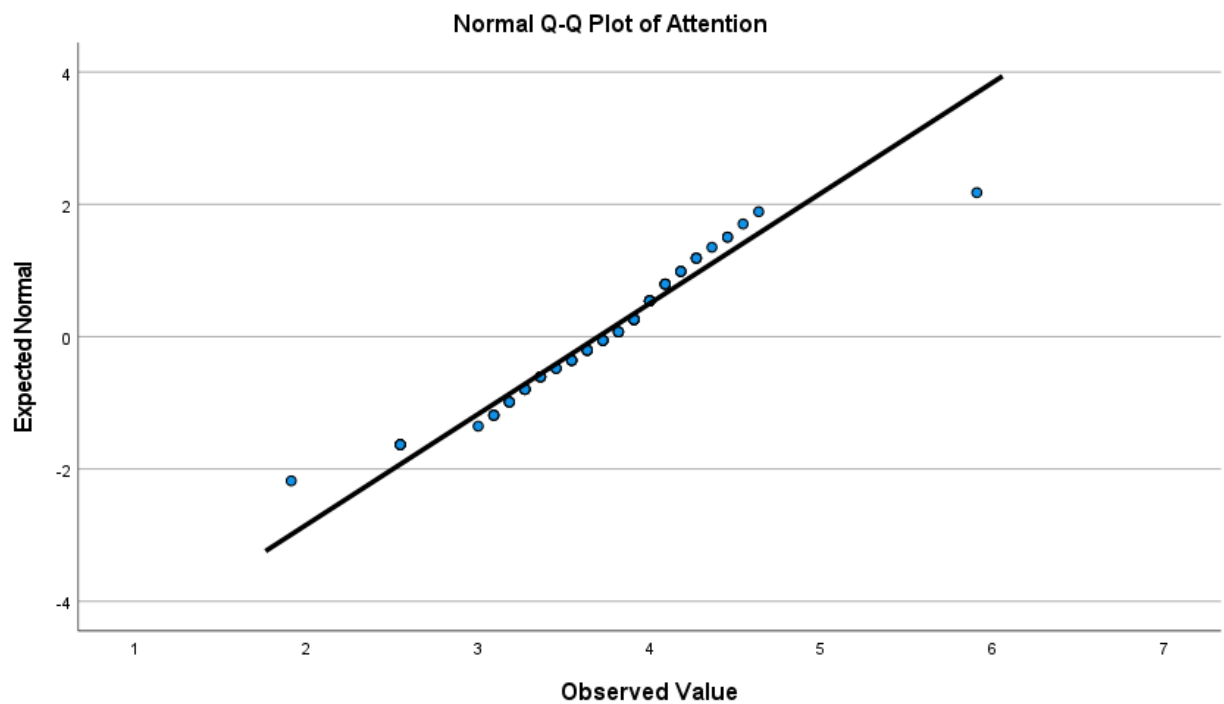
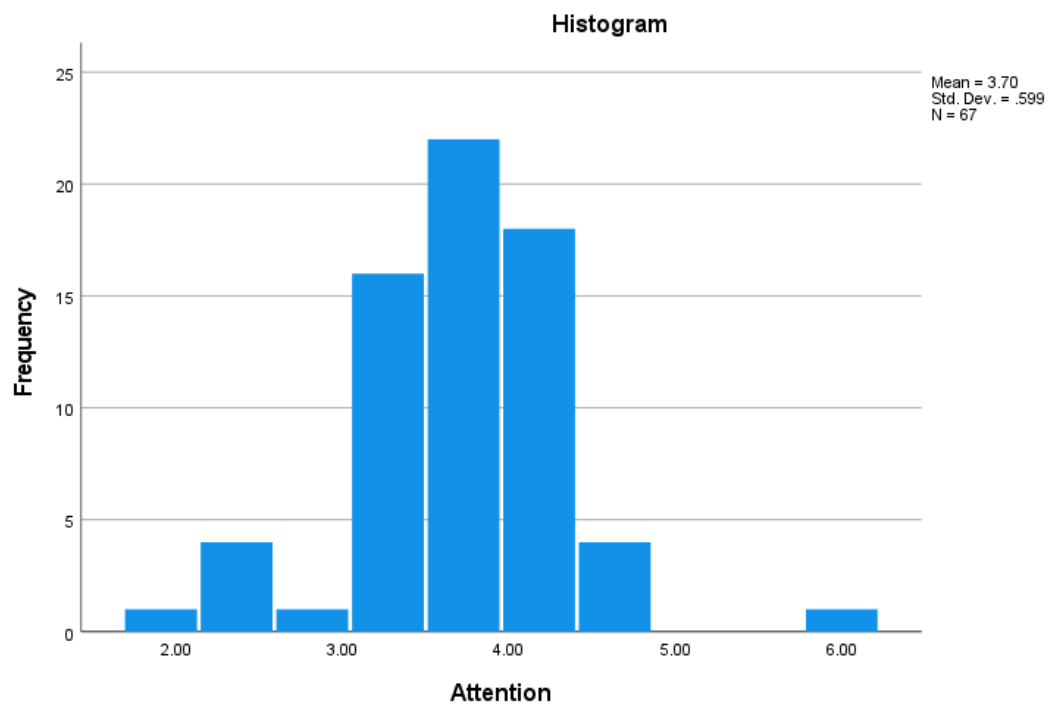
Table 17. Table of Normality test

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Motivation	.109	67	.048	.946	67	.006
Selfregulation	.119	67	.020	.979	67	.318
Strategies	.101	67	.088	.966	67	.064
Adaptability	.118	67	.022	.984	67	.567
Techefficacy	.109	67	.045	.972	67	.142
Interaction	.081	67	.200*	.978	67	.287
Attention	.084	67	.200*	.949	67	.008
Satisfaction	.094	67	.200*	.978	67	.270
Interactivity	.128	67	.008	.941	67	.003
Performance	.125	67	.011	.973	67	.153
Totalefficacy	.094	67	.200*	.968	67	.084
Totaloutcome	.120	67	.017	.955	67	.017
Understanding 2	.092	67	.200*	.970	67	.102
Interest2	.158	67	<.001	.942	67	.004
Value2	.198	67	<.001	.951	67	.010

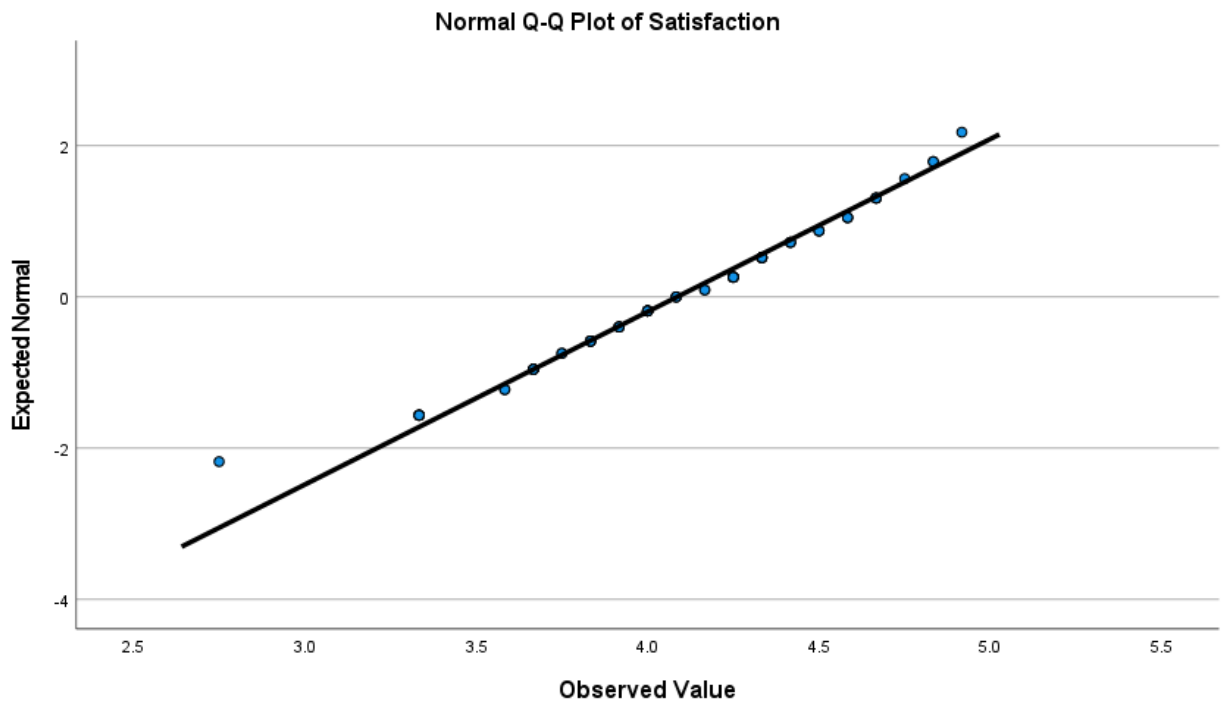
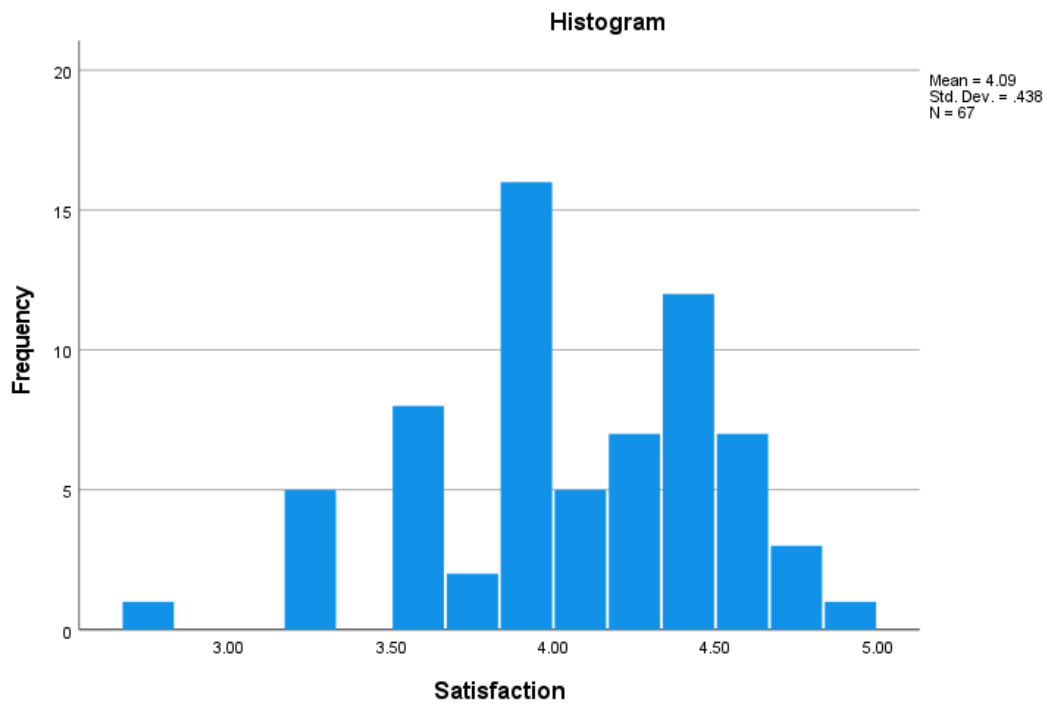
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

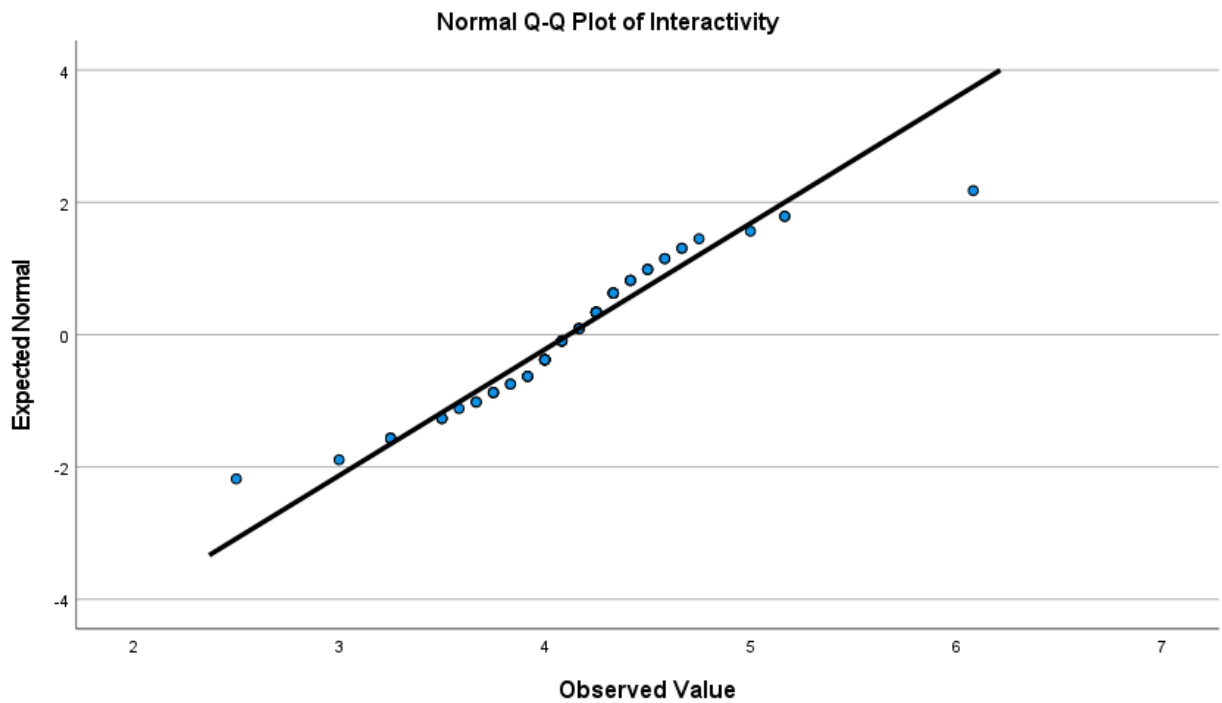
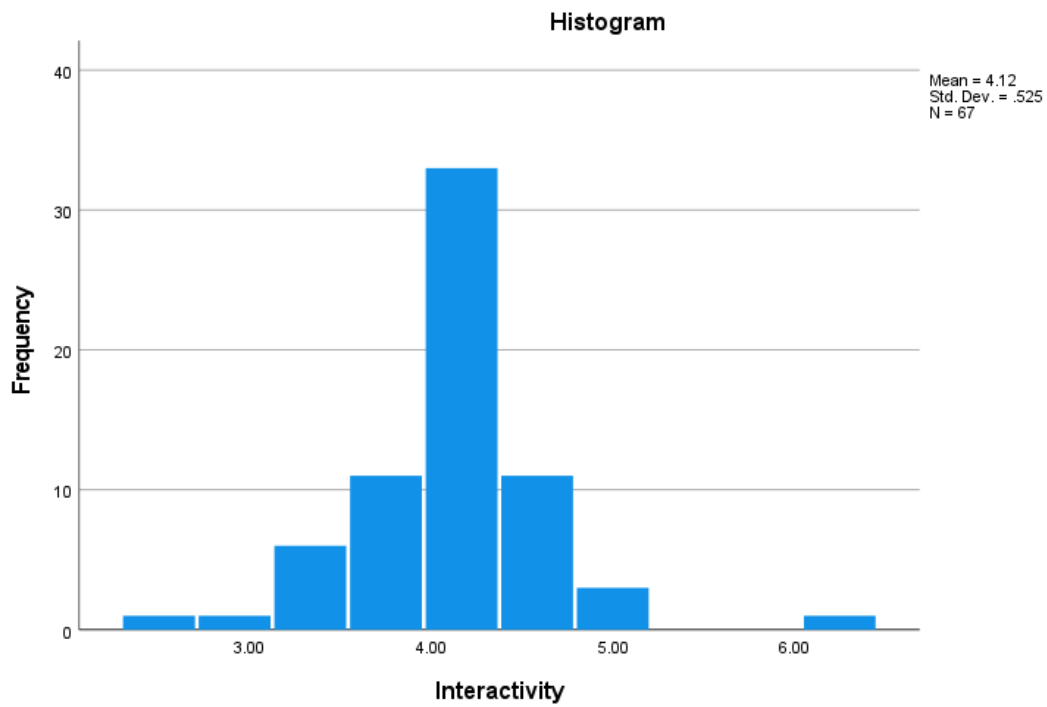
Table 18a Normality test of the main dimension of Attention :



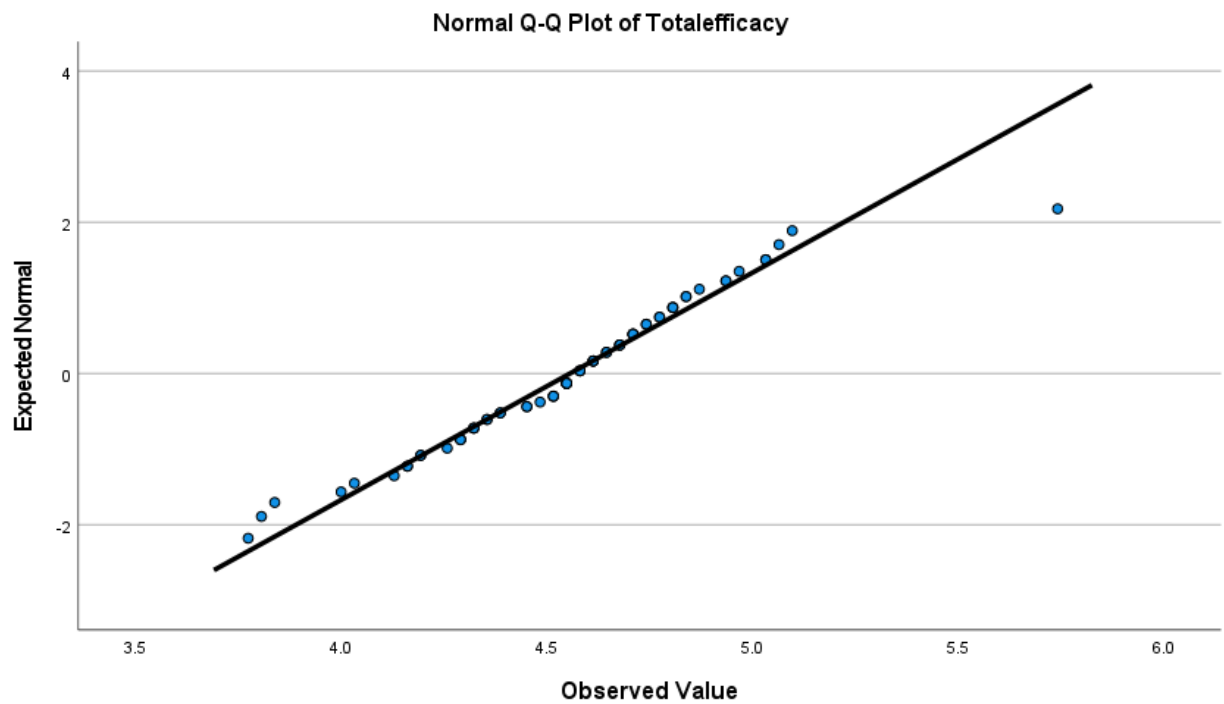
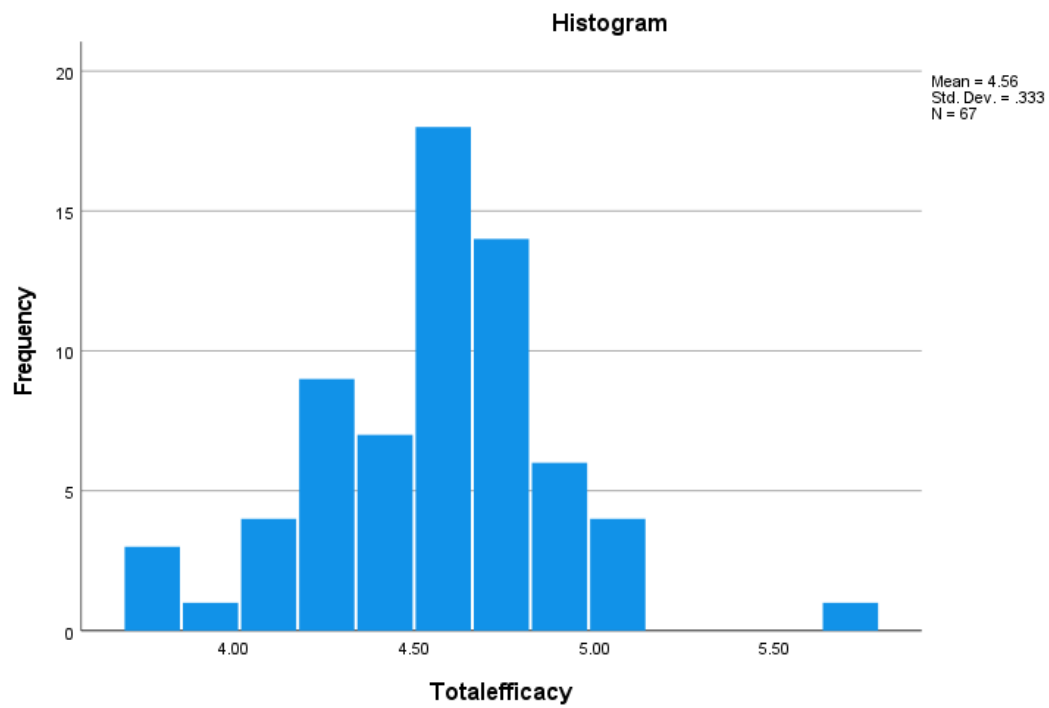
b. Normality test of the main dimension of Learning satisfaction



c. Normality test of the main dimension of Interactivity



d. Normality test of the main dimension of Self-efficacy



e. Normality test of the main dimension of Learning outcome

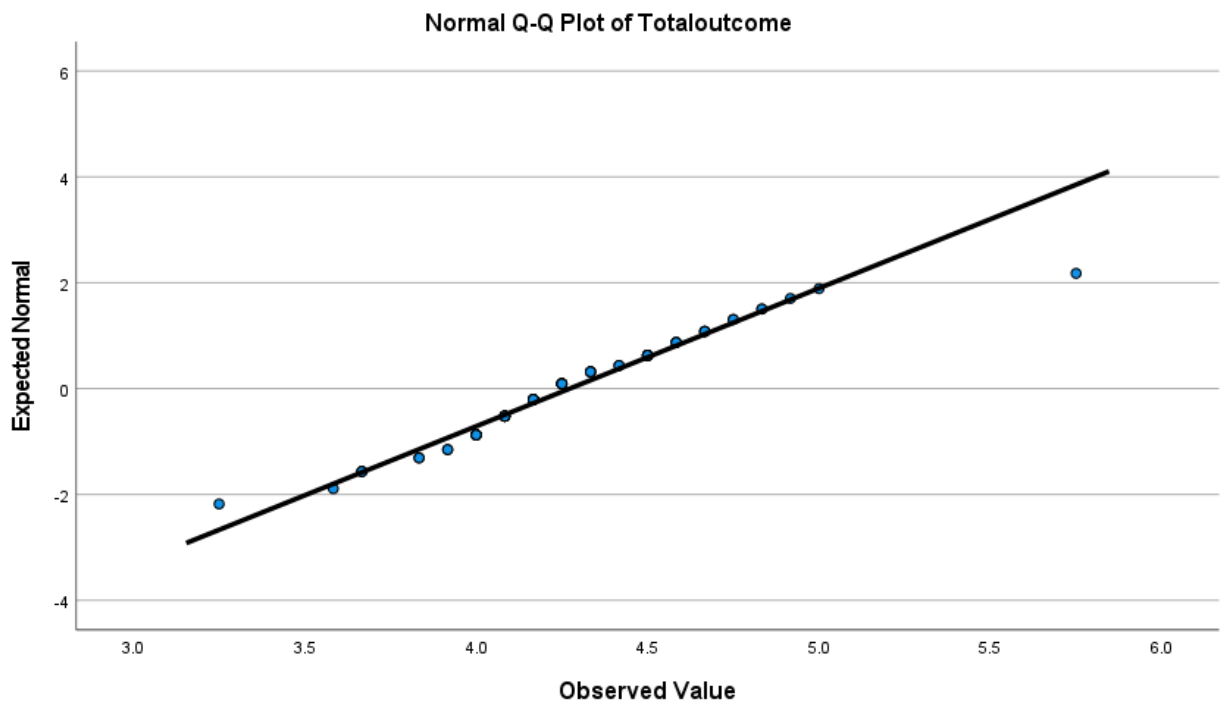
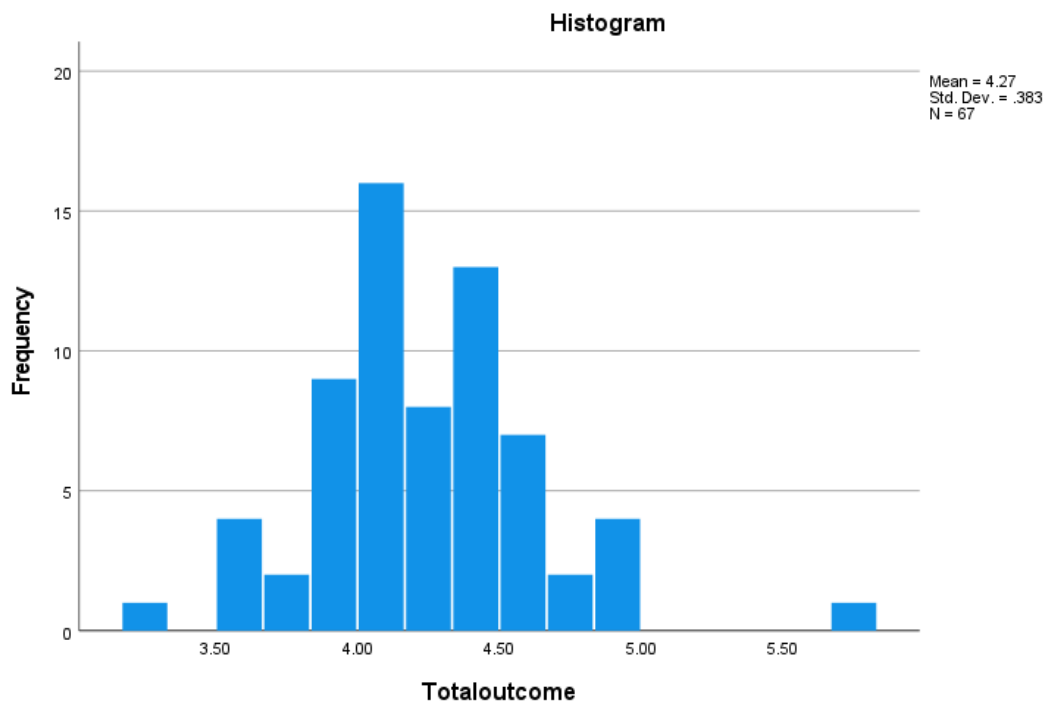


Table 19. Table of Demographic variables

		Statistics			
		age group	Total months of online exp category	total courses category	Male / Female
N	Valid	67	67	56	67
	Missing	0	0	11	0

		age group			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	60	89.6	89.6	89.6
	2.00	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

		Total months of online exp category			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	13	19.4	19.4	19.4
	2.00	54	80.6	80.6	100.0
	Total	67	100.0	100.0	

		total courses category			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	14	20.9	25.0	25.0
	2.00	11	16.4	19.6	44.6
	3.00	31	46.3	55.4	100.0
	Total	56	83.6	100.0	
Missing	System	11	16.4		
Total		67	100.0		

		Male / Female			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	32	47.8	47.8	47.8
	Female	35	52.2	52.2	100.0
	Total	67	100.0	100.0	

		Year			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	14	20.9	20.9	20.9
	3	22	32.8	32.8	53.7
	4	29	43.3	43.3	97.0
	PG year 1	2	3.0	3.0	100.0
	Total	67	100.0	100.0	

Table 20. T-test for difference in online experience

Independent Samples Test									
Levene's Test for Equality of Variances		t-test for Equality of Means							
				Significance				95% Confidence Interval of the Difference	
				One-Sided p	Two-Sided p			Lower	Upper
F	Sig.	t	df			Mean Difference	Std. Error Difference		

Totalefficacy	Equal variances assumed	.431	.514	-.092	65	.463	.927	-.00956	.10361	-.21647	.19736
	Equal variances not assumed			-.087	17.202	.466	.931	-.00956	.10926	-.23988	.22077
Satisfaction	Equal variances assumed	.276	.601	.094	65	.463	.925	.01282	.13622	-.25922	.28486
	Equal variances not assumed			.103	20.481	.460	.919	.01282	.12456	-.24661	.27225
Attention	Equal variances assumed	.472	.494	- 1.277	65	.103	.206	-.23530	.18419	-.60316	.13256
	Equal variances not assumed			- 1.540	23.982	.068	.137	-.23530	.15282	-.55072	.08012
Totaloutcome	Equal variances assumed	.040	.841	.167	65	.434	.868	.01994	.11933	-.21838	.25827
	Equal variances not assumed			.185	20.868	.427	.855	.01994	.10773	-.20418	.24407

Table 21. T-test for gender difference

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance One-Sided p	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
Total efficacy	Equal variances assumed	3.189	.079	-1.673	65	.050	.099	-.13439	.08032	-.29480	.02602
	Equal variances not assumed			-1.644	53.388	.053	.106	-.13439	.08173	-.29828	.02950
Satisfaction	Equal variances assumed	.268	.607	.745	65	.230	.459	.07999	.10739	-.13449	.29446
	Equal variances not assumed			.749	64.975	.228	.457	.07999	.10686	-.13342	.29339
Attention	Equal variances assumed	.191	.664	.948	65	.173	.347	.13896	.14664	-.15389	.43181

	Equal variances not assumed			.946	64.02 6	.174	.348	.13896	.14685	-.1544 1	.4323 3
Total outcome	Equal variances assumed	.231	.63 2	-.40 1	65	.345	.690	-.03787	.09438	-.2263 6	.1506 2
	Equal variances not assumed			-.39 8	61.25 6	.346	.692	-.03787	.09506	-.2279 3	.1521 9

Table 22. ANOVA test for difference in years of University education

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Total efficacy	Between Groups	.059	3	.020	.171	.915
	Within Groups	7.252	63	.115		
	Total	7.311	66			
Total outcome	Between Groups	.171	3	.057	.376	.771
	Within Groups	9.532	63	.151		
	Total	9.703	66			
Attention	Between Groups	.807	3	.269	.741	.531
	Within Groups	22.879	63	.363		
	Total	23.686	66			
Satisfaction	Between Groups	.181	3	.060	.305	.822

	Within Groups	12.458	63	.198		
	Total	12.638	66			

Table 23. T-test for age

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Satisfac	Between Groups	.737	1	.737	4.024	.049
	Within Groups	11.902	65	.183		
	Total	12.638	66			
Tout	Between Groups	.017	1	.017	.112	.739
	Within Groups	9.686	65	.149		
	Total	9.703	66			

Table 24. T-test for gender

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Significance One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Satisfac	Equal variances assumed	.268	.607	.745	65	.230	.459	.07999	.10739	-.13449	.29446

	Equal variances not assumed			.749	64.975	.228	.457	.07999	.10686	-.13342	.29339
Tout	Equal variances assumed	.231	.632	-.401	65	.345	.690	-.03787	.09438	-.22636	.15062
	Equal variances not assumed			-.398	61.256	.346	.692	-.03787	.09506	-.22793	.15219

Table 25. T-test for years of study

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Satisfac	Between Groups	.181	3	.060	.305	.822
	Within Groups	12.458	63	.198		
	Total	12.638	66			
Tout	Between Groups	.171	3	.057	.376	.771
	Within Groups	9.532	63	.151		
	Total	9.703	66			

Table 26. T-test for total academic courses attended

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Satisfac	Between Groups	.360	2	.180	.991	.378
	Within Groups	9.626	53	.182		
	Total	9.986	55			
Tout	Between Groups	.125	2	.062	.507	.605
	Within Groups	6.526	53	.123		
	Total	6.651	55			

Table 27. Correlation tables for all the sub-items of the five main dimensions

		Correlations													
		Interact	Teffic	Tout2	Perform	Understanding2	Interest2	Value2	Satisfy	Attend	Motivation	Selfregulation	Strategies	Adaptability	Techefficacy
Interact	Pearson Correlation	1	.245 ^{**}	.340 ^{**}	.059	.303 ^{**}	.095	.110	.410 ^{**}	.504 ^{**}	.008	.022	.057	.381 ^{**}	.171
	Sig. (2-tailed)		.046	.005	.634	.001	.444	.377	<.001	<.001	.946	.858	.645	.001	.166
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Teffic	Pearson Correlation	.245 ^{**}	1	.386 ^{**}	.318 ^{**}	.175	.056	.158	.181	.393 ^{**}	.643 ^{**}	.504 ^{**}	.526 ^{**}	.509 ^{**}	.463 ^{**}
	Sig. (2-tailed)	.046		.001	.009	.157	.655	.203	.142	<.001	<.001	<.001	<.001	<.001	<.001
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Tout2	Pearson Correlation	.340 ^{**}	.386 ^{**}	1	.543 ^{**}	.557 ^{**}	.361 ^{**}	.436 ^{**}	.113	.190	.300 ^{**}	.046	.100	.469 ^{**}	.156
	Sig. (2-tailed)	.005	.001		<.001	<.001	.003	<.001	.361	.124	.014	.714	.418	<.001	.206
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Perform	Pearson Correlation	.059	.318 ^{**}	.543 ^{**}	1	.014	-.066	-.089	.054	.177	.216	.103	.172	.288 ^{**}	.003
	Sig. (2-tailed)	.634	.009	<.001		.913	.598	.475	.663	.152	.080	.409	.164	.018	.979
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Understanding2	Pearson Correlation	.303 ^{**}	.175	.557 ^{**}	.014	1	-.082	.086	-.019	.035	.077	.092	-.119	.306 ^{**}	.221
	Sig. (2-tailed)	.001	.157	<.001	.913		.512	.498	.876	.780	.538	.460	.338	.012	.072
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Interest2	Pearson Correlation	.095	.056	.361 ^{**}	-.066	-.082	1	-.033	.126	.116	.023	.066	.063	.041	-.148
	Sig. (2-tailed)	.444	.655	.003	.598	.512		.790	.310	.351	.853	.598	.613	.742	.232
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Value2	Pearson Correlation	.110	.158	.436 ^{**}	-.089	.086	-.033	1	.072	.022	.254 ^{**}	-.212	.070	.236	.222
	Sig. (2-tailed)	.377	.203	<.001	.475	.489	.790		.563	.863	.038	.086	.571	.055	.071
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Satisfy	Pearson Correlation	.410 ^{**}	.181	.113	.054	-.019	.126	.072	1	.556 ^{**}	-.090	.233	-.117	.237	.141
	Sig. (2-tailed)	<.001	.142	.361	.663	.876	.310	.563		<.001	.469	.058	.344	.054	.256
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Attend	Pearson Correlation	.504 ^{**}	.393 ^{**}	.190	.177	.035	.116	.022	.556 ^{**}	1	.095	.042	.217	.441 ^{**}	.235
	Sig. (2-tailed)	<.001	<.001	.124	.152	.780	.351	.863	<.001		.443	.734	.077	<.001	.056
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Motivation	Pearson Correlation	.008	.643 ^{**}	.300 ^{**}	.216	.077	.023	.254 ^{**}	-.090	.095	1	.150	.173	.182	.143
	Sig. (2-tailed)	.946	<.001	.014	.080	.538	.853	.038	.469	.443		.226	.162	.141	.248
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Selfregulation	Pearson Correlation	.022	.504 ^{**}	.046	.103	.092	.066	-.212	.233	.042	.150	1	.146	-.038	-.019
	Sig. (2-tailed)	.858	<.001	.714	.409	.460	.598	.086	.058	.734	.226		.239	.759	.876
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Strategies	Pearson Correlation	.057	.526 ^{**}	.100	.172	-.119	.063	.070	-.117	.217	.173	.146	1	.207	.181
	Sig. (2-tailed)	.645	<.001	.418	.184	.338	.613	.571	.344	.077	.162	.239		.093	.192
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Adaptability	Pearson Correlation	.381 ^{**}	.509 ^{**}	.469 ^{**}	.288 ^{**}	.306 ^{**}	.041	.236	.237	.441 ^{**}	.182	-.038	.207	1	.345 ^{**}
	Sig. (2-tailed)	.001	<.001	<.001	.018	.012	.742	.055	.054	<.001	.141	.759	.093		.004
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Techefficacy	Pearson Correlation	.171	.463 ^{**}	.166	.003	.221	-.148	.222	.141	.235	.143	-.019	.161	.345 ^{**}	1
	Sig. (2-tailed)	.166	<.001	.206	.979	.072	.232	.071	.256	.056	.248	.876	.192	.004	
	N	67	67	67	67	67	67	67	67	67	67	67	67	67	67

Table 28. Correlation table for the five main dimensions

Correlations										
Correlations										
		Interact	Teffic	Tout2	Perform	Understanding 2	Interest2	Value2	Satisfy	Attend
Interact	Pearson Correlation	1	.245*	.340**	.059	.383**	.095	.110	.410**	.504**
	Sig. (2-tailed)		.046	.005	.634	.001	.444	.377	<.001	<.001
	N	67	67	67	67	67	67	67	67	67
Teffic	Pearson Correlation	.245*	1	.386**	.318**	.175	.056	.158	.181	.393**
	Sig. (2-tailed)	.046		.001	.009	.157	.655	.203	.142	<.001
	N	67	67	67	67	67	67	67	67	67
Tout2	Pearson Correlation	.340**	.386**	1	.543**	.557**	.361**	.436**	.113	.190
	Sig. (2-tailed)	.005	.001		<.001	<.001	.003	<.001	.361	.124
	N	67	67	67	67	67	67	67	67	67
Perform	Pearson Correlation	.059	.318**	.543**	1	.014	-.066	-.089	.054	.177
	Sig. (2-tailed)	.634	.009	<.001		.913	.598	.475	.663	.152
	N	67	67	67	67	67	67	67	67	67
Understanding2	Pearson Correlation	.383**	.175	.557**	.014	1	-.082	.086	-.019	.035
	Sig. (2-tailed)	.001	.157	<.001	.913		.512	.488	.876	.780
	N	67	67	67	67	67	67	67	67	67
Interest2	Pearson Correlation	.095	.056	.361**	-.066	-.082	1	-.033	.126	.116
	Sig. (2-tailed)	.444	.655	.003	.598	.512		.790	.310	.351
	N	67	67	67	67	67	67	67	67	67
Value2	Pearson Correlation	.110	.158	.436**	-.089	.086	-.033	1	.072	.022
	Sig. (2-tailed)	.377	.203	<.001	.475	.488	.790		.563	.863
	N	67	67	67	67	67	67	67	67	67
Satisfy	Pearson Correlation	.410**	.181	.113	.054	-.019	.126	.072	1	.556**
	Sig. (2-tailed)	<.001	.142	.361	.663	.876	.310	.563		<.001
	N	67	67	67	67	67	67	67	67	67
Attend	Pearson Correlation	.504**	.393**	.190	.177	.035	.116	.022	.556**	1
	Sig. (2-tailed)	<.001	<.001	.124	.152	.780	.351	.863	<.001	
	N	67	67	67	67	67	67	67	67	67

*. Correlation is significant at the 0.05 level (2-tailed).
 **. Correlation is significant at the 0.01 level (2-tailed).

Table 29. Table of Multi-linear Regression (by model 4 in PROCESS function) on mediation effect of Self -efficacy /Attention on learning outcome)

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 4
Y : Tout
X : Interact
M1 : Teffic
M2 : Attent

Sample
Size: 67

OUTCOME VARIABLE:
Teffic

Model Summary

R	R-sq	MSE	F	df1	df2	p
.2450	.0600	.1057	4.1521	1.0000	65.0000	.0457

Model

	coeff	se	t	p	LLCI	ULCI
constant	3.9161	.3166	12.3706	.0000	3.2839	4.5484
Interact	.1554	.0763	2.0377	.0457	.0031	.3078

Standardized coefficients

coeff
Interact .2450

OUTCOME VARIABLE:
Attent

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5040	.2540	.2718	22.1330	1.0000	65.0000	.0000

Model		coeff	se	t	p	LLCI	ULCI
constant		1.3309	.5076	2.6220	.0109	.3172	2.3447
Interact		.5755	.1223	4.7046	.0000	.3312	.8198

Standardized coefficients

	coeff
Interact	.5040

OUTCOME VARIABLE:

Tout

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.5231	.2737	.1119	7.9129	3.0000	63.0000	.0001

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.6167	.5992	2.6982	.0089	.4194	2.8141
Interact	.2423	.0910	2.6627	.0098	.0605	.4242
Teffic	.3392	.1348	2.5167	.0144	.0699	.6085
Attent	.0305	.0840	.3625	.7182	-.1375	.1984

Standardized coefficients

	coeff
Interact	.3316
Teffic	.2944
Attent	.0476

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

Tout

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.4277	.1829	.1220	14.5545	1.0000	65.0000	.0003

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.9855	.3400	8.7809	.0000	2.3065	3.6646
Interact	.3126	.0819	3.8150	.0003	.1489	.4762

Standardized coefficients

	coeff
--	-------

Interact .4277

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_cs
.3126	.0819	3.8150	.0003	.1489	.4762	.4277

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_cs
.2423	.0910	2.6627	.0098	.0605	.4242	.3316

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	.0703	.0741	-.0709	.2146
Teffic	.0527	.0505	-.0345	.1604
Attent	.0175	.0532	-.0922	.1210

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	.0961	.1014	-.0958	.2944
Teffic	.0721	.0681	-.0494	.2135
Attent	.0240	.0728	-.1209	.1721

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

----- END MATRIX -----

Table 30. Table of Multi-linear Regression (by model 4 in PROCESS function) on mediation effect of Self-efficacy /Attention on learning satisfaction

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 4

Y : Satisfac

X : Interact

M1 : Teffic

M2 : Attent

Sample

Size: 67

OUTCOME VARIABLE:

Teffic

Model Summary

R	R-sq	MSE	F	df1	df2	p
.2450	.0600	.1057	4.1521	1.0000	65.0000	.0457

Model

	coeff	se	t	p	LLCI	ULCI
constant	3.9161	.3166	12.3706	.0000	3.2839	4.5484
Interact	.1554	.0763	2.0377	.0457	.0031	.3078

Standardized coefficients

	coeff
Interact	.2450

OUTCOME VARIABLE:

Attent

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5040	.2540	.2718	22.1330	1.0000	65.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.3309	.5076	2.6220	.0109	.3172	2.3447
Interact	.5755	.1223	4.7046	.0000	.3312	.8198

Standardized coefficients

coeff
Interact .5040

OUTCOME VARIABLE:

Satisfac

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5779	.3340	.1336	10.5314	3.0000	63.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.4819	.6549	3.7900	.0003	1.1732	3.7905
Interact	.1478	.0995	1.4856	.1424	-.0510	.3465
Teffic	-.0709	.1473	-.4811	.6321	-.3652	.2235
Attent	.3563	.0919	3.8793	.0003	.1728	.5399

Standardized coefficients

coeff
Interact .1772
Teffic -.0539
Attent .4878

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

Satisfac

Model Summary

R	R-sq	MSE	F	df1	df2	p
.4098	.1679	.1618	13.1192	1.0000	65.0000	.0006

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.6787	.3916	6.8403	.0000	1.8966	3.4607
Interact	.3418	.0944	3.6220	.0006	.1533	.5303

Standardized coefficients

coeff
Interact .4098

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_cs
.3418	.0944	3.6220	.0006	.1533	.5303	.4098

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_cs
.1478	.0995	1.4856	.1424	-.0510	.3465	.1772

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	.1940	.0761	.0383	.3422
Teffic	-.0110	.0281	-.0775	.0429
Attent	.2051	.0847	.0337	.3669

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	.2326	.0959	.0425	.4186
Teffic	-.0132	.0342	-.0962	.0500
Attent	.2459	.1070	.0377	.4565

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

----- END MATRIX -----

Table 31. Table of Regression (by model 6 in PROCESS function) on the mediation effect of Self-efficacy/ Attention / Learning satisfaction in relationship between Interactivity and Learning outcome

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 6

Y : Tout
X : Interact
M1 : Teffic
M2 : Attent
M3 : Satisfac

Sample
Size: 67

OUTCOME VARIABLE:
Teffic

Model Summary

R	R-sq	MSE	F	df1	df2	p
.2450	.0600	.1057	4.1521	1.0000	65.0000	.0457

Model

	coeff	se	t	p	LLCI	ULCI
constant	3.9161	.3166	12.3706	.0000	3.2839	4.5484
Interact	.1554	.0763	2.0377	.0457	.0031	.3078

Standardized coefficients

	coeff
Interact	.2450

OUTCOME VARIABLE:
Attent

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5757	.3314	.2474	15.8640	2.0000	64.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.6921	.8870	-.7803	.4381	-2.4640	1.0799
Interact	.4952	.1204	4.1137	.0001	.2547	.7357
Teffic	.5166	.1897	2.7225	.0083	.1375	.8956

Standardized coefficients

	coeff
Interact	.4337
Teffic	.2870

OUTCOME VARIABLE:

Satisfac

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5779	.3340	.1336	10.5314	3.0000	63.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.4819	.6549	3.7900	.0003	1.1732	3.7905
Interact	.1478	.0995	1.4856	.1424	-.0510	.3465
Teffic	-.0709	.1473	-.4811	.6321	-.3652	.2235
Attent	.3563	.0919	3.8793	.0003	.1728	.5399

Standardized coefficients

	coeff
Interact	.1772
Teffic	-.0539
Attent	.4878

OUTCOME VARIABLE:

Tout

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5233	.2738	.1136	5.8453	4.0000	62.0000	.0005

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.6507	.6693	2.4664	.0164	.3128	2.9885

Interact	.2443	.0933	2.6183	.0111	.0578	.4309
Teffic	.3382	.1361	2.4853	.0157	.0662	.6102
Attent	.0353	.0943	.3747	.7091	-.1531	.2238
Satisfac	-.0137	.1162	-.1176	.9068	-.2459	.2186

Standardized coefficients

	coeff
Interact	.3344
Teffic	.2936
Attent	.0552
Satisfac	-.0156

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

Tout

Model Summary

R	R-sq	MSE	F	df1	df2	p
.4277	.1829	.1220	14.5545	1.0000	65.0000	.0003

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.9855	.3400	8.7809	.0000	2.3065	3.6646
Interact	.3126	.0819	3.8150	.0003	.1489	.4762

Standardized coefficients

	coeff
Interact	.4277

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_cs
.3126	.0819	3.8150	.0003	.1489	.4762	.4277

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_cs
.2443	.0933	2.6183	.0111	.0578	.4309	.3344

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	.0682	.0742	-.0781	.2124
Ind1	.0526	.0499	-.0365	.1589
Ind2	.0175	.0498	-.0957	.1097
Ind3	-.0020	.0169	-.0337	.0387

Ind4	.0028	.0103	-.0156	.0300
Ind5	.0002	.0030	-.0056	.0074
Ind6	-.0024	.0195	-.0420	.0393
Ind7	-.0004	.0039	-.0099	.0068

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	.0934	.1018	-.1060	.2895
Ind1	.0719	.0672	-.0497	.2102
Ind2	.0239	.0684	-.1286	.1526
Ind3	-.0028	.0229	-.0454	.0513
Ind4	.0039	.0143	-.0208	.0415
Ind5	.0002	.0041	-.0075	.0098
Ind6	-.0033	.0265	-.0564	.0532
Ind7	-.0005	.0053	-.0132	.0095

Indirect effect key:

Ind1 Interact	->	Teffic	->	Tout				
Ind2 Interact	->	Attent	->	Tout				
Ind3 Interact	->	Satisfac	->	Tout				
Ind4 Interact	->	Teffic	->	Attent	->	Tout		
Ind5 Interact	->	Teffic	->	Satisfac	->	Tout		
Ind6 Interact	->	Attent	->	Satisfac	->	Tout		
Ind7 Interact	->	Teffic	->	Attent	->	Satisfac	->	Tout

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

----- END MATRIX -----

Table 32 – Questionnaire

Dear friends, ladies and gentlemen,

Thank you for considering completing this Questionnaire which is prepared by a student named Ms. Vivian Chih of the DBA program of the University of Wales Trinity Saint David (UWTSD) pursuant to a research conducted Ms. Chih about the **effect of online education** in the post Covid-19 era, with a view to better the design and delivery of online educational classes in higher institutions in HK.

You can be rest assured that all of your personal identity and information, together with all the answers you give hereunder in this Questionnaire will be kept strictly **confidential** and will not be used for any purposes other than the research purpose of Ms. Vivian Chih in the said DBA program.

If you do agree to the completion of this Questionnaire, please **circle the word ‘Consent’** (within bracket) inside the box below indicating your consent to the completion of this Questionnaire.

Your participation will significantly contribute to the research over the efficacy of online education in Hong Kong nowadays. Thank you very much for your kind assistance indeed.

I do consent to the completion of this Questionnaire and the usage of the information I shall give hereunder for the purpose of the research of Ms. Vivian Chih in her DBA research program.

(Consent)

I am a year _____ student of _____ University majoring in the degree of _____.

My age is _____. My gender is _____. My nationality is _____.

Since January 2020, I have experienced a total number of _____(months) of online education in

the study of a total number of _____(academic courses) pursuant to the degree of _____ .

Date of completion of this Questionnaire: ____/(date)____/(month)____/(year).

The following questions are about your online educational experience since January 2020 up to the present. Please answer **with reference to your personal experience in one or several online educational classes** in the said period of time.

Please **circle the number** representing the **degree of correctness** about your personal situation / opinion.

(Note: 1 represents ‘**Not at all true of me**’ whereas.....7 represents ‘**Very true of me**’)

		Not at all true of me				Very true of me			
No.	Questions	1	2	3	4	5	6	7	
	Interactivity of teaching	1	2	3	4	5	6	7	
1.	The online platform for teaching is user-friendly.	1	2	3	4	5	6	7	
2.	There is a sense of community through online discussion and/or group class projects	1	2	3	4	5	6	7	
3.	The instructor has provided structured exercises and activities.	1	2	3	4	5	6	7	
4.	The instructor has provided links to suitable sites to stimulate online discussions.	1	2	3	4	5	6	7	
5.	Students are given opportunities to participate in group class projects.	1	2	3	4	5	6	7	
6.	Class discussions are monitored regularly.	1	2	3	4	5	6	7	
7.	Assignments/activities are assigned to help the online discussion.	1	2	3	4	5	6	7	
8.	The instructor has offered advice and hints for developing online skills	1	2	3	4	5	6	7	
9.	The instructor adopts social media and/or computer technologies to design interactive text to stimulate students’ learning interest.	1	2	3	4	5	6	7	

10.	The instructor is quick in feedback and reply to students' concerns.	1	2	3	4	5	6	7
11.	The instructor encourages students to share their comments and opinion online.	1	2	3	4	5	6	7
12.	There is a lot of real-time online teaching and class discussion.	1	2	3	4	5	6	7
	Motivation							
13.	It is important for me to learn the course material in the class.	1	2	3	4	5	6	7
14.	I want to do well in the class because it is important to show my ability to my family, friends, employer, or others.	1	2	3	4	5	6	7
15.	I'm confident I can understand the most complex material presented by the instructor in the course.	1	2	3	4	5	6	7
16.	I am very interested in the content area of the course.	1	2	3	4	5	6	7
17.	Getting a good grade in the class is the most satisfying thing for me right now.	1	2	3	4	5	6	7
18.	I work hard to do well in the class even if I don't like what we are doing.	1	2	3	4	5	6	7
19.	When course work is difficult, I either give up or only study the easy parts.	1	2	3	4	5	6	7
20.	I often feel so lazy or bored when I study for the class that I quit before I finish what I planned to do.	1	2	3	4	5	6	7
	Self-regulation	1	2	3	4	5	6	7
21.	When it comes to learning and studying, I am a self-directed person.	1	2	3	4	5	6	7
22.	In my studies, I am self-disciplined and find it easy to set aside reading and homework time.	1	2	3	4	5	6	7
23.	I am able to manage my study time effectively and easily complete assignments on time.	1	2	3	4	5	6	7
24.	In my studies, I set goals and have a high degree of initiative.	1	2	3	4	5	6	7
25.	I rarely find time to review my notes or readings before an exam.	1	2	3	4	5	6	7
26.	I find it hard to stick to a study schedule.	1	2	3	4	5	6	7
	Learning strategies	1	2	3	4	5	6	7
27.	When I study for the course, I go through the readings and my class notes and try to find the most important ideas.	1	2	3	4	5	6	7
28.	When I study for the course, I write brief summaries of the main ideas from the readings and my class notes.	1	2	3	4	5	6	7
29.	If I get confused taking notes in class, I make sure I sort it out afterwards.	1	2	3	4	5	6	7
30.	I memorize key words to remind me of important concepts in the class.	1	2	3	4	5	6	7
31.	I ask myself questions to make sure I understand the material I have been studying in this class.	1	2	3	4	5	6	7

	Adaptability	1	2	3	4	5	6	7
32.	I try to change the way I study in order to fit the course requirements and the instructor’s teaching style	1	2	3	4	5	6	7
33.	If course readings are difficult to understand, I change the way I read the material.	1	2	3	4	5	6	7
34.	When I study for this class, I pull together information from different sources, such as lectures, readings, and discussions.	1	2	3	4	5	6	7
	Technology efficacy	1	2	3	4	5	6	7
35.	I am able to easily access the Internet as needed for my studies.	1	2	3	4	5	6	7
36.	I feel comfortable communicating electronically.	1	2	3	4	5	6	7
37.	I possess sufficient computer skills for doing online work	1	2	3	4	5	6	7
38.	I am agile in using asynchronous and synchronous conferencing system.	1	2	3	4	5	6	7
	Interaction	1	2	3	4	5	6	7
39.	I ask the instructor to clarify concepts I don’t understand well.	1	2	3	4	5	6	7
40.	I welcome supervision by instructor over group discussion because the instructor can give instant feedback, suggestions and guidance.	1	2	3	4	5	6	7
41.	I enjoy real-time video-conferencing with teachers and/or break room group discussion with students.	1	2	3	4	5	6	7
42.	I try to work with other students from this class to complete the course assignments.	1	2	3	4	5	6	7
	I enjoy learning through direct interaction with the text e.g. via website links, video clips and podcasts.	1	2	3	4	5	6	7
	Attention	1	2	3	4	5	6	7
43.	I find real-time online class discussion helpful in raising students’ attention in class.	1	2	3	4	5	6	7
44.	The real-time teaching by instructors improves my concentration, motivation and interest to learn.	1	2	3	4	5	6	7
45.	The use of webcam is helpful to focus my attention in class.	1	2	3	4	5	6	7
46.	The instructor’s supervision over the online group discussion is helpful to raise my attention and motivation for discussion.	1	2	3	4	5	6	7
47.	Online classroom discussion increases my desire and courage to speak up.	1	2	3	4	5	6	7
48.	The chat room discussion platform facilitates me to raise question and express my opinion.	1	2	3	4	5	6	7
49.	Online classroom discussion helps me to be more aware of the opinion of other students.	1	2	3	4	5	6	7
50.	Direct interaction with the text increases my attention, interest and initiative to learn more.	1	2	3	4	5	6	7

51.	Online group discussion / workshop projects raise my sense of community and desire to help each other to excel.	1	2	3	4	5	6	7
52.	Online group discussion / workshop projects raise my sense of competitiveness to beat the other groups' performance.	1	2	3	4	5	6	7
53.	I easily doze off or loose attention in non-interactive online teaching sessions.	1	2	3	4	5	6	7
	Learning satisfaction	1	2	3	4	5	6	7
54.	I find the online educational experience positive and effective for the advancement of my study.	1	2	3	4	5	6	7
55.	I find the online learning experience interesting and stimulating for me.	1	2	3	4	5	6	7
56.	I am satisfied with the quality and efficacy of the teaching delivered by the instructor.	1	2	3	4	5	6	7
57.	I am satisfied with the communication and interaction with the instructor.	1	2	3	4	5	6	7
58.	I feel that face to face contact with my instructor is necessary for learning to occur.	1	2	3	4	5	6	7
59.	I am satisfied with the quality and efficacy of the structure and content of the learning text.	1	2	3	4	5	6	7
60.	I am satisfied with the online communication and interaction with other students.	1	2	3	4	5	6	7
61.	I tend to share more opinion over the online discussion platform.	1	2	3	4	5	6	7
62.	I am pleased with the online educational experience, as it is flexible and time-saving.	1	2	3	4	5	6	7
63.	I am pleased with the online educational experience, since it allows me to re-visit the teaching recording to enhance my understanding of the teaching content.	1	2	3	4	5	6	7
64.	I find the online learning experience boring.	1	2	3	4	5	6	7
65.	I feel lonely, isolated and ignored during the online teaching session.	1	2	3	4	5	6	7
	Learning outcome							
	<i>Cognitive understanding</i>	1	2	3	4	5	6	7
66.	My intellectual understanding of the subject matter has increased after the study.	1	2	3	4	5	6	7
67.	I can apply what I have learnt from the online course to my future career or to other academic subjects.	1	2	3	4	5	6	7
68.	I feel confused and disillusioned after the online study.	1	2	3	4	5	6	7
	<i>Interest</i>							
69.	My interest in the subject matter has increased at the end of the online course.	1	2	3	4	5	6	7

70.	The online learning experience has raised my interest to do further research in the same area in the future.	1	2	3	4	5	6	7
	The online learning experience has widened my perspective and aroused my interest to study some other subjects in the future.	1	2	3	4	5	6	7
	Value							
71.	I think the course material in this class is useful for me to learn.	1	2	3	4	5	6	7
72.	I find the subject matter very practical and is of high commercial value.	1	2	3	4	5	6	7
73.	I find the subject matter is of significant intellectual value.	1	2	3	4	5	6	7
	Performance							
74.	My grade in the subject matter has improved after the online study.	1	2	3	4	5	6	7
75.	The feedback for me from the instructor is more favorable after the online study.	1	2	3	4	5	6	7
76.	My confidence in the subject matter has increased after the online study.	1	2	3	4	5	6	7

(This is the end of the Questionnaire)

Thank you very much for your kind assistance in answering this Questionnaire!