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A new way of social interaction for educational purposes in architecture design studios during the pandemic

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Abstract

COVID-19 has challenged educational systems in whole parts of the world, including convenient courses and programs such as architecture. The architecture program is designed based on the design studios that deliver major parts of the activities in the program, such as design productions, project presentations, and receiving comments on the design activities from both instructors and juries. To test the students' satisfaction level with social interactions in design studio activities, a five-scale questionnaire was designed, and through Google Forms, the results were analyzed in SPSS. The findings reveal that communication, social interaction, and design activities are significant for the students. The students demonstrate overall satisfaction with the quality of the course delivery. However, the detailed design illustrates that students and instructors adopted an adapted way to the condition to reduce the risk by minimizing the group work and increasing the individual desk crits. This result shows that teamwork and peer learning were reduced during the pandemic.

1. Introduction

An architecture design studio is a basic course that trains students. This course repeats each year and semester in the architecture programs in both bachelor's and master's programs due to the structure of the architecture curriculum (Schon, 1984; 1987). The design studios are the core space for teaching, learning, and training different subjects by instructors and students to draw architectural projects, present design ideas, and receive comments and critiques from the studio coordinator or invited juries. This process of working with the students in design studios includes a strong background in training art and architecture students in Europe, particularly documented in France with Beaux Art and Ecole Polytechnique (Draper, 1977; Drexler, 1975; Garric, 2017; Griffin, 2022; Tafahomi, 2021a), Bauhaus, and "Vkhutemas (Higher Artistic and Technical Workshops in the Soviet Union)" (Dizdar, 2015; Tafahomi, 2021a; Tafahomi, 2023).

The design studio in both art and architecture includes a big room with some drawing tables and chairs for the students to do practical drawings of the different parts of the building, from the abstract concepts to the detailed aspects of the design and construction (Garric, 2017; Griffin, 2022; Tafahomi & Chance, 2023). All activities of the students take place in the design studio, such as studies, drawing, physical model making, and presentations for the example (Tafahomi, 2021b). Although there are some workshops for carpentry, ceramic, metal, and concrete in some universities, many universities still do all the required activities in the design studios, such as the University of Rwanda (DoA, 2012). The students work for three to five years, dependent on the structure of the education in the design studios to develop their knowledge, skills, and ability in drawing, design, and imagination under the supervision of the master of the design studio (Tafahomi, 2023). The studio activities include a set of teamwork and task arrangements between the students and instructors to work on the specific architectural projects (Franz, 1994; Frayling, 1993) that create sets of discussions, dialogues, and social interaction around one table at an intimate distance (FAED, 2009).

** According to the author's Ethics Committee Approval Certificate dated October 8, 2023, and numbered 20231005 (file number), this article has no ethical issues. All responsibility belongs to the researchers. All parties were involved in the research of their own free will.*

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The COVID-19 condition resulted in social distancing and wearing face masks for all university students, online activities, and blended classes for theoretical courses. However, the design studios remained on campus as face-to-face activities similar to the other practical courses in the universities (Ando, 2021; Tafahomi, 2022a). Importantly, stick reduction protocols and measures were required to control the pandemic for the physical classes through face masks wearing, social distance, and washing hands or sanitization (Filiz & Konukman, 2020). Particularly, the physical classes were recommended to use alternative scenarios such as local parks, open spaces, tennis courts, or football pitches. However, the activities in the design studios included a long list of activities that students normally preferred to stay in the design due to practical activities (Tafahomi, 2021a) and even theoretical courses (Tafahomi, 2022b). However, the study exposed positive effects of the COVID-19 on the education of architecture program even in the first year (Abu Alatta et al., 2023; Tafahomi, 2021c).

The activities in the design studio face difficulties in delivering educational materials based on a continuous process of dialogue, discussion and communication about the design projects between students and instructors (Schon, 1984; 1987) making it different from other programs in the pandemic time. In other words, wearing face masks and social distance contradicted the character of the design studio due to the activities in the design studios such as group work, desk-crits (desk critiques), and physical model making that all of them run based on the close social distance collaboration and teamwork activities. Therefore, it is supposed that the students have experienced the quality of the design studios during the COVID-19 times based on compulsory measures. To discover the quality of the delivery of the courses during the pandemic time, an online questionnaire was designed to search for the opinions of the students about the quality of the design studio to evaluate the level of satisfaction of the students with the activities in design studios based on the below hypothesis:

H0: there is no association between wearing face masks and social distance measures and the students' satisfaction with the quality of social interaction in design studios during the pandemic.

H1: there is an association between wearing face masks and social distance measures and the students' satisfaction with the quality of social interaction design studios during the pandemic.

The main objective of this research is to determine the quality of the design studios during the pandemic time based on the importance of the quality of the design studio in the whole architecture program. In other words, design studios are significant criteria and indicators for evaluating the quality of the architecture program. So, if the quality of the design studios cannot meet the needs of the students in the training process, the activities in the program will not be successful. However, if the quality of the design studios is acceptable to the users' opinions, the design studios achieve the expected learning outcomes of the program and curriculum.

2. Studies on wearing face masks and social distance in design studios

COVID-19 has resulted in facing the world with an unexpected situation in which the public and private sectors are discovering solutions to the problems (Demir et al., 2021; 2023). Particularly, education activities have experienced a new form of teaching and learning based on blended, online, wearing face masks, and social distance (Buldan, 2021; Ersin et al., 2020). The scale of the effects was global, and the study highlighted that the pandemic affected education activities in more than 185 countries including 1.5 billion people (Marinoni et al., 2020). Wearing face masks and social distancing were key measures to control and protect the students in on-campus study. For this reason, some recommendations were raised to control health conditions, such as healthy classrooms, sustainable architecture design, and medical point of view (Doha et al., 2022). However, the results of the research on the pandemic reported different results including both positive and negative effects on the teaching and learning process in higher education, particularly due to the design studio context (Buldan, 2021; Dizdar, 2015).

The first cluster of studies emphasized the positive aspects of the pandemic to accelerate the speed of blended and online learning in higher education. This group of the study listed some of the key aspects, such as the facilitation of distance learning (Buldan, 2021), a good sense of online teaching and learning (Ersin et al., 2020; Abu Alatta et al., 2023), and a combination of the experimental activities with blended learning (Delialioglu & Yildirim, 2007; Gulbahar & Madran, 2009; Tafahomi, 2021c). The second cluster of studies criticized the achievement of education during the pandemic. For example, the study revealed a high level of anxiety and stress among the users in the online learning activities (Naylor & Nyanjom, 2020), deficiencies in educational materials (Apriyanti, 2020), unpredictability in the educational models (Avcı & Oruc, 2020), less accessibility to site for the analysis (Tafahomi, 2021c), problems for the eyes contact (Simmons et al., 2015), and physical activities (Charlotte et al., 2023) and contact in classes (Ando, 2021; Bonnes & Bonaiuto, 2002; Seifert & Sutton, 2009; Woolfolk, 2016).

ISSN: 2149-5939

Importantly, wearing face masks and being in a position of social distance in the classroom has not been normal teaching conditions for lecturers and students. The study by Will (Will, 2020) highlighted two important aspects of wearing face masks in communication in the classroom, including low-quality pronunciation and unclear lips to predict the exact words through observation, which reduced the possibility getting stress, attributes, and emotions of the presentations in the design studios. Covering the face under masks decreased expression through facial communication (O'Hagan et al., 2022) and eye contact with the users (Simmons et al., 2015). In addition, the study by McKeever (Mckeever, 2022) discovered that wearing face masks changes the level of oxygen in the blood and automatically influences the rhythms of breathing among classroom participants.

However, a design studio encompasses many activities more than a normal classroom does due to various tasks and practical exercises (Frayling, 1993; Garric, 2017). Architectural design studios were defined as the core modules (Borden & Ray, 2006) based on the practical activities of the students in a project-oriented approach under the supervision of the instructors in the whole architecture program (Tafahomi, 2022c). The activities in design studios are constructed on continuous dialogue and interaction between the students and the instructor (Schon, 1987). The design studio is where the students spend most of their educational time studying, drawing, presentation, and learning activities (Ching, 2015; Laseau, 2000). Working together in a design studio has created a specific title for studio culture based on the presentation, interaction, and communication as a small society in academia (Schon, 1984). The level of social interaction between the participants in a design studio is so high due to working together (Gillies, 2003) on design projects in the same process such as drawing, discussion, critiques (crits), and physical model making (Garric, 2017; Griffin, 2022).

The study highlighted the students developed their abilities such as interaction, communication (Garrison & Kanuka, 2004), and presentation through peer learning (Lee, 2005; Woolfolk, 2016) and the practices of instructors (Seifert & Sutton, 2009) in design studios. The students observe other behavioral patterns of classmates and lecturers (Tafahomi, 2021d) to learn different skills. The students personalize, specialize, and fit the activities in their style to apply in the learning process (Salkind, 2008; Santrock, 2011). However, wearing face masks and social distancing reduced the opportunities for the students to fulfill the learning process in the normal way in design studios.

In other words, the teacher and students shape the educational atmosphere (Morgan & Shackelford, 2018) in both studio design and classrooms. The design studios are formed based on a continuity discussion, questions and answers, comments, and drawings between the instructors and students (Dizdar, 2015; Drexler, 1975; Filiz & Konukman, 2020; Frayling, 1993; Schon, 1984). This process includes sets of physical activities together (Bold & Hutton, 2007), and individual for the design production and presentation (Borden & Ray, 2006). This interaction between instructors, students, projects, and educational context (Bold & Hutton, 2007; McClean & Hourigan, 2013). Architecture projects are based on processes and procedures that differ from time to time due to the level of interaction between students, instructors, and projects. Therefore, some level of communication, interactions, and interpretations always is needed in design studios (Mugerauer, 1995; Tafahomi & Chance, 2023).

In summary, wearing face masks and social distancing have been measures to control the pandemic in many countries. However, this new situation created obstacles to normal education in many institutes, particularly the architectural design studios. An architectural design studio is arranged based on the social interaction and communication between the participants through presentations, dialogues, and comments that take the form of the desk-crits. Wearing face masks and social distancing have had some side effects on the normal process of all physical and social interactions, especially in design studios. The design studio differentiation's important aspect occurred when sitting and drawing together in the desk crits activity. This specification of working together as a team contradicted the social distance and wearing face masks in daily activities.

3. Method and materials

According to the author's Ethics Committee Approval Certificate dated October 8, 2023, and numbered 20231005 (file number), this article has no ethical issues. All responsibility belongs to the researchers. All parties were involved in the research of their own free will. The methodology part of this research included five sections: methodology, research design, research process, data specifications and sampling, time, and context.

Methodology: studies discussed both qualitative and qualitative methods to evaluate the quality of teaching and learning education, especially in higher education such as (Cohen et al., 2007; Creswell, 2012; Johnson & Christensen, 2014; Tafahomi, 2021b; Creswell & Creswell, 2018). It was common to observe that the studies applied more questionnaires and statistical analysis in the quantitative research to evaluate the opinions of the

ISSN: 2149-5939

students and to find out respondents and correlations between the answers (Peers, 1996; Neuman, 2006; Almquist et al., 2014; Tafahomi, 2021b; Tafahomi, 2021a; Woolfolk, 2016). Despite the variety of questionnaires (Frankfort-Nachmias et al., 2014), the Likert scale questionnaire is one of the applicable styles in research (Xi et al., 2017; Yang et al., 2013; Tafahomi, 2021e). While the study criticized the unclear scales in the Likert questionnaire (Joshi et al., 2015), the Likert scale questionnaires were applied in educational research, importantly concerning the students' cases in the teaching and learning qualities (Li, 2013; Hartley, 2014; Huertas-Delgado et al., 2019; De Campos et al., 2020). Likert scale questionnaires were common due to the cluster of answers, the ability to sort data, and adaptation to statistical analysis (De Campos et al., 2020; Tafahomi, 2022a; Yang et al., 2013).

Research design: this research applied a five-scale Likert questionnaire to ask the students about the quality of the design studio activities (Schon, 1984) due to wearing face masks and social distancing during the pandemic. The questionnaire was designed based on relationships between the activities in the design studios and the level of satisfaction by the students due to course outputs. To achieve essential data, the questionnaire was divided into different questions to discover the fundamental activities in the design studios importantly individual and group desk-crits (Dizdar, 2015; Drexler, 1975; Filiz & Konukman, 2020; Frayling, 1993; Schon, 1984), discussion (Delialioglu & Yildirim, 2007; Filiz & Konukman, 2020; Lee, 2005), questions and answers (O'Hagan et al., 2022; Schon, 1987; Will, 2020), drawing together with the instructor (Buldan, 2021; Dizdar, 2015; Griffin, 2022; Schon, 1984; Seifert & Sutton, 2009), eye content among the participants (Avcı & Oruc, 2020; Simmons et al., 2015), physical activities and gestures (Ando, 2021; Bonnes & Bonaiuto, 2002; Seifert & Sutton, 2009; Woolfolk, 2016). To evaluate the level of satisfaction of the students about the quality of the activities in the design studios due to wearing face masks and social distancing, the quality of the course, the delivery of the lecturer, learning outcomes, and the quality of voice, quality of the interaction, communication was asked to see if there was any association between the activities in the design studios and the level of the satisfactions of the students. The questionnaire was designed based on an online mode for all the students through Google Forms. Despite the differentiations between the topics, themes, and scales of the projects in the different years of the program, the questions attempted to point out the common activities in the design studios in the department.

Research process: the draft of the questionnaire was checked with three students in the final year of study in the department to see if the questions were clear for respondents. After receiving the students' comments, the questionnaire draft was corrected and then shared with two lecturers in the school to see if any other aspects were missed in the design process. The lecturers' comments were constructed based on the integration of similar questions to reduce the length of the questionnaire. The corrected questionnaire was uploaded to Google Forms, and the students' email addresses were collected from the department's administrative office. The link to the questionnaire was shared with the students, and they were asked to answer the questionnaire at a convenient time.

However, after one month, only a few students answered the questionnaire. The researcher sent three reminders in the next two months to ask them to complete the questionnaire. In the last attempt, I asked the representative to call the students to respond to the questionnaire. This process took three months, and after many follow-ups on the requests, 118 students filled out the questionnaire, and other students did not respond to the request. The collected data was downloaded through Google Forms in Excel format, and after correcting, the quantitative data was inserted in SPSS 20 for analysis.

Data specification and sampling method: the data was combined from the 118 architecture department students who answered the questionnaire. The questionnaire was divided into two sections, including questions that referred to the level of satisfaction of the students with the activities in the design studios, and the second part asked about the general judgment of the students about the quality of the delivery of the courses and the learning outcomes. Although the sample group covered all the students in the department, 118 out of 136 students collaborated in the research process. Seemingly, there were some wrong, inactive, or changed emails that the administrative office was unaware of, and some of the students in the village during the pandemic had difficulty accessing the internet, which was difficult for them. For these reasons, the total number of respondents differed from the total sample in the statistical society of the research.

Research time and context: The research took place in the Department of Architecture and Design at the University of Rwanda and included 136 students in five years of study. Due to the country's policy to measure COVID-19, wearing face masks, social distancing, and sanitization of hands were compulsory. Although the classes were online and blended learning mode, the policy was changed to on-campus activities as face-to-face modes for practical courses such as design studio. The instructors of the design studios had the right to decide the number and

ISSN: 2149-5939

percentage of students who should participate in the hands-on activities due to the measure of social distance in each session. Nonetheless, all students and lecturers faced the practical courses at the time.

The design studios took the place on the second floor of the department. All the design studios included an open space with drawing tables, chairs, shelves for achieving physical models, and normal desks. The drawing tables were rearranged with open distances between them due to measures such as social distance in the design activities. Both instructors and the students did the activities with the weaning face masks and social distancing in the design studios. Although the students learned to work closely with instructors and other students on the drawing tables, the new measure changed the design studio's position and atmosphere based on wearing face masks and social distance.

4. Results

The research data were analyzed using SPSS software and included two categories. The first group of the analytical data was combined from the Mean, Median, and Mode of each question concerning both activities in design studios and the level of satisfaction of the students from the courses during the pandemic due to wearing face masks and social distance. This data set demonstrated that the students were more satisfied with the individual activities with the instructor than with common activities in the design studios. The data are presented in Table 1.

The Mean, Median, and Mode of some questions emphasized the individual working of the students with the instructor in design studios through desk crits and drawing, as questions 14, 16, and 18 in Table 1 referred to such criteria. Despite the high level of marking by the students for the studio activities, the level of marking for the satisfaction with the course outputs was lower. Just two questions were close to the three values of Mean that referred to the desk-crits and design outputs' including questions 15 and 19 in Table 1.

Table 1. Descriptive table of the questions

No	Questions	Mean	Median	Mode
Q1	Understanding of comments through the discussion	3.55	4	4
Q2	Understanding of comments through eye contact with instructors	3.66	4	4
Q3	Understanding of critics with the drawing together	3.82	4	4
Q4	Understanding of critics through physical gesture of instructor	3.65	4	4
Q5	Understanding of comments through asking questions	3.78	4	4
Q6	Observing other students' desk-crits	3.03	3	3
Q7	Individual desk-crits	4.02	4	4
Q8	Assume what perhaps the instructor mentions	3.31	3	3
Q9	Group desk-crits	3.40	3	4
Q10	The quality of the voice due to masks and social distance	3.12	3	3
Q11	The lecturers delivered the topics effectively	3.10	3	3
Q12	The quality of the courses was sufficient	2.84	3	3
Q13	The students performed effectively	2.58	3	3
Q14	The quality of the course delivery satisfied me	2.73	3	3
Q15	The outputs of the design studio satisfied me	2.78	3	3
Q16	The quality of social interaction satisfied me	2.40	2	2
Q17	The quality of design presentation satisfied me	2.74	3	3
Q18	The quality of communication in design studio satisfied me	2.67	3	3
Q19	The quality of comments and critics in design studio satisfied me	2.86	3	3
Q20	The physical environment of the design studio (space, distance, and temperature) supported design activities of the students	2.55	3	3
Q21	The facilities in the design studio (internet, power, and light) supported design activities of the students	2.41	3	4
Q22	Equipment in the design studio (chair, tables, boards) supported design activities of the students	2.49	3	4

To evaluate the relationships between the quality of the design studio and the level of satisfaction of the students from the quality of the voice and social distance, the Log of the level of satisfaction of the students and the quality of the design studio due to wearing face masks and social distance evaluate through Chi-square test. The crosstab (X2 N=1544.619, df=1350, P=.000) demonstrated an association between the students' satisfaction and the activities in the design studio (Table 2). To evaluate the influence of wearing face masks and social distance on the clarity of the voice and communication in the design studio, the voice factor and the design studio activities were examined through chi-square analysis. The results demonstrated an association (X2 N=1063.657, df=840, p= .000) between the voice quality and the architectural studios' design activities. This result confirmed an association between the quality of the voice and design activities. The detailed chi-square analysis demonstrated other

ISSN: 2149-5939

aspects of the association between the voice quality in the social distance and design activities in the design studios (Table 3). The chi-square analysis demonstrated that the quality of the voice while wearing face masks and the social distance was associated with all aspects of activities in design studios except three factors, including physical gestures of instructors, group desk crits, and assumptions of the students about topics highlighted with grey color in Table 4.

Table 2. Crosstab of satisfaction and design studio

Description	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1544.619[a]	1350	.000
Likelihood Ratio	481.637	1350	1.000
Linear-by-Linear Association	6.384	1	.012
N of Valid Cases	118		

Table 3. Crosstab between Log voice and social distance and the activities in the design studios

Description	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1063.657[a]	840	.000
Likelihood Ratio	405.624	840	1.000
Linear-by-Linear Association	32.380	1	.000
N of Valid Cases	118		

Table 4. The relation between the quality of the voice in social distance and design studio activities

No	The quality	Aspects in design studios	P value reports
1		Understanding of comments through the discussion	N=37.884, df=16, p=.002
2		Understanding of comments through eye contact	N=37.263, df=16, p=.002
3		Understanding of critics with the drawing together	N=30.890, df=16, p=.014
4	Influence of	Understanding of critics through physical gesture of instructor	N=24.121, df=16, p=.087
5	the quality of	Understanding of comments through asking questions	N=32.051, df=16, p=.010
6	voice in social	Observing other students' desk-crits	N=29.129, df=16, p=.023
7	distance con-	Individual desk-crits	N=52.157, df=16, p=.000
8	dition on the	Group desk-crits	N=14.911, df=16, p=.531
9		Assume what perhaps the instructor mentions	N=16.342, df=16, p=.429

A chi-square analysis of data between factors in design studio activities and students' satisfaction levels presented some statistical associations. In detail, the discussion activity in the design studio was statistically associated with the opinion of the students about the quality of delivery of the courses by lectures (N=40.406, df=12, p=.000), quality of the courses (N=69.080, df=16, p=.000), and quality of social interaction (N=51.586, df=16, p=.000) in the pandemic time. Therefore, according to the chi-square results, there was adequate evidence to demonstrate that the discussion activity in the design studios was statistically associated with the level of satisfaction of the students about the delivery of the courses.

The eye contact activities between the instructors and the students in the design studio were statistically associated with the quality of the delivery of the courses (N=35.799, df=16, p=.003), quality of the communication (N=42.643, df=16, p=.000), quality of the desk critics (N=41.361, df=16, p=.000), and the design presentation (N=33.059, df=16, p=.007). The drawing together in design studios was statistically associated with the question on the lecturers delivered the courses sufficiently (N=22.616, df=16, p=.018), quality of social interaction (N=29.863, df=16, p=.019), quality of communication (N=40.305, df=16, p=.001), quality of desk critics (N=38.014, df=16, p=.002). The gestures of the instructors in design studios were statistically associated with the lecturers delivered the courses sufficiently (N=30.092, df=12, p=.031) and the quality of communication (N=28.708, df=16, p=.026).

The asking questions activities in design studios from the instructors were statistically associated with the satisfaction from the outputs of the design studios (N=75.541, df=16, p=.000) and quality of desk-crits (N=29.121, df=16, p=.023). The observing desk-crits of other students in design studios was statistically associated with the level of satisfaction of the students with the quality of the social interaction (N=43.621, df=16, p=.000), the quality of desk-crits (N=39.879, df=16, p=.001), and quality of the physical environment of the design studio (N=38.822,

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df=16, p=.001). The individual desk-crits activity in design studios was statistically associated with the students' satisfaction level with the quality of desk critics (N=39.879, df=16, p=.001). In the opposite activity, the group desk critics' activity in design studios was not statistically associated with the students' satisfaction level.

The assuming the topics and themes of the courses in design studios were statistically associated with the level of satisfaction of the students with the lecturers delivered the courses sufficiently (N=22.250, df=12, p=.035), quality of courses (N=63.872, df=16, p=.000), the quality of desk-crits (N=30.579, df=16, p=.015), quality of the physical environment in the design studio (N=28.439, df=16, p=.028), and quality of the equipment in the design studio (N=31.559, df=16, p=.011). Importantly, the students' satisfaction level with the quality of facilities, the student's performance, and the quality of the courses were not associated with any criteria in the design studios. In addition, the group desk critics' activities in the design studios did not influence any satisfaction criteria through the chi-square analysis.

4.1. Findings

The results of the analysis demonstrate an association between wearing face masks and the level of satisfaction of the students about the delivery of the courses during the pandemic. Despite the quantitative data and analysis, the research findings referred to some important qualitative factors in the analysis outputs, including interactions, communications, and design production factors highlighted in the analysis and data.

The analysis results demonstrate that social interaction in the design studio has been important for the students in evaluating the quality of the courses in terms of wearing face masks and social distance conditions. For this reason, they select the items that directly refer to the personal and individual interactions between the students and the instructors in design studios, such as individual desk crits and discussions on the design process. In addition, a close distance between the students and the instructors to make possible eye contact is important for the students to evaluate the quality of the courses and activities of the lecturers in the design studios. The answers to the questions highlight that the students are satisfied with the quality of their talking voice when the participants use face masks with an obligatory social distance. This interaction between the students and lecturers takes place in the desk-crits' activities based on the design studios' interaction, importantly the items such as drawing together, discussing, and observing other students' desk-crits.

The data analysis through the Chi-square reveals that communication in the design studio is another key factor that refers to the dialogue between the students, instructor, and design project. The students and instructors are in the design studio to develop a design project, and this objective is achieved through active dialogue and communication. In particular, eye contact, drawing together, making gestures to the instructor, and observing other students' desk-crits are important activities in the design studio to form communication between the students and instructors. These factors demonstrate that communication depends not only on the voice and verbal language medium but also on activities such as physical movement and drawing together as a tool for communication.

Design activity is the main purpose of design studios. However, the results did not demonstrate any significant factors that reduced the quality of the courses due to wearing face masks and social distancing. Despite wearing masks and social distancing in design studios, the students and lecturers innovated a style to communicate on the desk crits by drawing together to achieve the expected results for the design studios during the pandemic. As a matter of fact, the students emphasize the individual desk-crits as a more effective way of interaction, communication, and learning outcomes. In addition, eye contact, asking questions, and desk-crits are more important factors in the design production process due to the chi-square results. In fact, some items in chi-square analysis refer to such results as discussion, eye contact, desk crits, gestures of the instructors, and asking questions. Wearing face masks and social distancing could not create a significant problem for the design studio where everyone works to develop a design project through individual desk crits, physical activities, and asking questions.

The results illustrate that most of the activities in the design studios take place in individual activities rather than group work, such as desk crits, asking questions, and discussion. It means that the students in the design studios preferred to work individually rather than as a team due to the wearing of face masks and social distance measures. On the other extreme, although the analysis results reveal that the students in the grouping from the desk crits can achieve the design development through interactions in the design studio, the students emphasize and prefer the individual crits due to wearing face masks and social distance. This result can reveal that the students attempt to reduce the risk of group activities through individual activities with instructors to personalize and specialize the learning process for themselves.

ISSN: 2149-5939

5. Discussion

Despite both negative and positive literature on the influences of COVID-19 on education, the results of the research demonstrated that the students preferred to follow their style of activities in the design studio (Tafahomi, 2022a; Tafahomi, 2022b) as mentioned in terms of interaction through desk-crits by Schon (Schon, 1987). The studies mentioned the positive effects of the pandemic time on blended learning (Delialioglu & Yildirim, 2007; Gulbahar & Madran, 2009), however, the students' answers demonstrated that they preferred a physical class for social interaction. This result highlighted that the essence and character of the design studio differed from the normal classrooms in presenting the courses in blended and online models of education (Schon, 1984; Tafahomi, 2021c).

The results revealed that the students and instructors successfully interacted in the design studios due to the wearing of face masks and social distancing. The studies mentioned the difficulty of voice and facial interaction with wearing face masks and social distance (Will, 2020; O'Hagan et al., 2022; Mckeever, 2022). However, the findings of this research argued the results. They revealed that both students and instructors adopted a flexible way for design activities in the design studios, and this was important through desk crits, individual comments, and group discussions with some personalized measurements to fit the measures with the studio conditions. This result illustrated that communication, interaction, and presentation were the key aspects of design studios even during the pandemic time (Tafahomi, 2021e; 2021d).

The results showed that students and instructors supported a physical and face-to-face working model in the design studio. While respect for the measures was not part of the research, participants in the design studio followed their styles during the pandemic. It meant the atmosphere of design studios created freedom for the participants to draw their level of social distance and discussion with the face masks. This level of freedom and personalization of the design studios' activities referred to the design studios' differentiation from regular classrooms. Two factors were important in this personalization process, first the design objects such as maps, physical models, and drawing boards (Schon, 1987; Tafahomi, 2022c), and second, the desk crits activities that made the participants so close to the requested social distance (Delialioglu & Yildirim, 2007; Tafahomi, 2021a).

The findings of this research also identified that the students took distance from the usual activities in a design studio as group desk-crits (Schon, 1987; Tafahomi, 2022c) and peer learning (Lee, 2005; Woolfolk, 2016; Tafahomi, 2021d) toward an individual style of working that it contradicted the results for the social interaction (Tafahomi, 2021e). It revealed that the students fit into the COVID-19 condition to find a way for safe social interaction in the design studio, even if it is not a usual activity. For this reason, the individual desk-crits were an essential factor for the students to evaluate the quality of the course during the pandemic time. It approved the theory of Schon (Schon, 1984; Schon, 1987) in the studies on the character of architecture education through dialogue and interaction between the students and the instructors. The students preferred the individual desk-crits as a more compelling factor to evaluate the quality of the learning outcomes.

6. Conclusion

The pandemic challenged all educational processes and procedures, particularly in higher education and architecture design studios, to adapt learning activities to the conditions. Through an online five-scale Likert questionnaire, the students' satisfaction level with the quality of the delivery of the courses was evaluated, and the results reveal that the students were satisfied with the courses in the architecture design studios due to wearing face masks and social distancing. Notably, the students referred to the courses' social interaction, communication, and learning outcomes.

However, social interaction and communication were limited to individual activities between instructors and students, such as drawing together in terms of individual desk-crits in the design studios. The results of the analysis demonstrate the students significantly believe in achieving successful course delivery through individual desk-crits in terms of social interaction in design studios. This means that the students were unsatisfied with the group desk-crits, which contradicted the social interactions in the design studios. The students changed the form of participation for the social interactions in the design studios to reduce the risks of the pandemic through individual activity and making small groups of participants in each desk-crit, discussion, and drawing. The meaning of social interaction changed to a small scale based on the measures of COVID-19 for better safety conditions.

Despite wearing face masks and social distancing as difficulties for education during the pandemic, other factors such as eye contact, gestures, and graphical presentations could facilitate social interaction and communication

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in design studios. Notably, the gestures of the lecturers in the design studios covered the problem of voice quality in the communication process. The students find those factors important in the level of stratification with course outputs based on the achievements in drawing together, doing desk crits, and designing presentations.

Although the data and results did not demonstrate any significant factor for reducing the quality of delivery of the courses, seemingly, the students attempted to present their respectfulness to the activities of the lecturers and instructors in the design studios during the pandemic time based on a reciprocal understanding. The contradiction between some items, on the one hand, social interaction and communication, and on the other hand, individual desk crits and drawing together present that the general ideas of the students are different from the detailed ones. In fact, despite the satisfaction with the delivery of the courses, the detailed items demonstrate significant divination from the teamwork and peer learning activities to the individual learning in the design studios. The pandemic changed the quality of activities and also changed the assumptions and expectations of the students simultaneously in design studios.

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The author self-contributed the research design and implementation, analysis, and the manuscript's writing.

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The author reported no potential competing interest.

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