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The Opportunity to Up-skill Students' Verbal Representation in Design Process at Online Architecture Studios

H. Pourmehdi Ghaemmaghami, A. Khaki Ghasr*

Department of Architecture, Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran

ABSTRACT

Background and Objectives: All academic fields, including architecture, were taught online during the COVID-19 pandemic. Architectural design studios were the most challenging courses offered online among all the architectural courses. The benefits and disadvantages of teaching in online design studios have been studied through research on practitioner feedback. The current study focuses on the advantages of online studios and emphasizes the importance of verbal representation in the architectural design process. As verbal representation is utilized in the design process, with verbal description being one of its tools, the question arises: Is it feasible to enhance the verbal representation skills of architecture students, despite the limitations in content transmission and the challenges encountered during online studio delivery?

Materials and Methods: The research methodology is qualitative. It is based on a systematic literature review and case study in which authors have used an autoethnography approach, sharing their experiences as online instructors during the COVID-19 crisis. The case study was carried out via thematic analysis supported by coding employing tactics including observations, memos, self-evaluation of students, and questionnaires. The research took place at Shahid Beheshti University's Faculty of Architecture and Urban Planning for five academic semesters (2019-2022). The statistical population included 147 students (111 undergrads and 36 graduates).

Findings: The results demonstrate that, due to the constraints of material sharing compared to face-to-face studios, architectural design online studios rely primarily on listening senses and linguistic skills. The results show an improvement in students' verbal representation (both oral and written), which varies depending on the studios. In online studios, 86% of students reported that their writing ability had improved, and 73% reported that their oral representation had improved. It is worth noting that students in online studios rate verbal representation in written format as the second most improved skill out of six. As a result, the level of usage and acceptability of written and oral representation in the creative process in online studios has not been consistent, and it may alter for various reasons. Some key points that make it successful include the instructor's preference for employing verbal description and representation in the studio, the student's potential in verbal description, the theme of the design studio, and where we are in the design process.

Conclusions: Online architectural design studios provide students with the chance to improve their verbal representation skills. Additionally, one of the bases of delivering online studios is the ability to express ideas clearly via language, which also plays a compensating role during the design process in maintaining the studios' quality. Use of this feature in hybrid, online, or face-to-face studios could be part of future plans. The valuable tasks to be carried out should be defined and experienced in this context so that they can be implemented at the beginning, middle, or end of the design process. The practice of expressing the scenario, defining the design problem, writing the design statement, preparing sessions for reading descriptions from renowned authors' texts, as well as the sessions for critiquing the works of students and architects in the online studios in tutorial and judgment sessions, can be listed among them.

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
54	2	6

مقاله پژوهشی

فرصت تقویت مهارت بازنمایی کلامی دانشجویان در فرآیندِ طراحیِ کارگاه های برخطِ معماری

حسین پورمهدی قایم مقامی، آزاده خاکی قصر*

گروه معماری، دانشکده معماری و شهرسازی، دانشگاه شهید بهشتی، تهران، ایران

چکیده

پیشینه و اهداف: در دوران پاندمی کووید-۱۹، همه رشته ها از جمله معماری به صورت برخط تدریس شدند. در میان دروس رشته معماری، کارگاههای طراحی معماری چالش برانگیزترین دروسی بودند که به صورت برخط برگزار شدند. در طول دوران پاندمی و پس از آن، محققان حوزه آموزش معماری درباره بازخوردهای تجربه زیسته تدریس در کارگاه های طراحی معماری برخط پژوهش هایی انجام داده داده اند و مزایا و معایب آن را برشمرده اند. مطالعه پیش رو با تمرکز بر نقاط قوت کارگاه های برخط و توجه به اهمیت بازنمایی کلامی در فرایند طراحی معماری، ســعی دارد یا نظریه آنکه بازنمایی کلامی در فرایند طراحی کاربرد دارد و توصیف کلامی یکی از ابزارهای آن است پاسخ این پرسش را بیابد : آیا با وجود محدودیت های انتقال محتوا و شــرایطی که در برگزاری کارگاههای برخط داشــتیم، امکان تقویت مهارت ارائه کلامی برای دانشجویان معماری فراهم شد؟

روش ها: روش به کار رفته، کیفی و مبتنی بر مطالعات کتابخانه ای و موردپژوهی تجربه زیســته کارگاه های برخط طراحی معماری در پاندمی کروناست. در مطالعات کتابخانه ای از مرور نظام مند استفاده شده است. در موردپژوهی از روش کیفی تحلیل مضمون به پشتوانه کدگذاری با استفاده از روش های مشاهده، یادداشت برداری، بررسی بروندادهای دانشجویان، پرسشنامه و خودارزیابی دانشجویان بهره گرفته شده است. مدت مطالعه، پنج نیمسال تحصیلی (دوران پاندمی کرونا : ۲۰۲۲-۲۰۱۹) در دانشکده معماری و شهرسازی دانشگاه شهیدبهشتی است. جامعه آماری متشکل از ۱۴۷ دانشجو است (۱۱۱=N دانشجویان کارشناسی و ۳۶=N دانشجویان کارشناسی ارشد).

یافته ها: نتایج نشان می‌دهد که کارگاه های برخط طراحی معماری، به دلیل محدودیت‌های به اشتراک گذاشتن محتوا به نســبت با کارگاه های حضوری، در جبران آن، اتکای بســیار به حواس شــنیداری و ظرفیت های زبانی دارند. نتایج حاکی از ارتقای توان بازنمایی کلامی (شامل شفاهی و مکتوب) دانشجویان است که بسته به شرایط هر کارگاه آموزشی میزان آن متغیر اســت. از نگاه ۸۶٪ از دانشــجویان، توان بازنمایی کلامی آنها به صــورت مکتوب در کارگاه های برخط پیشرفت داشته است و ۷۳٪ از دانشجویان مهارت بازنمایی کلامی شفاهی خود را ارتقایافته ارزیابی کردند. شایان ذکر اســت مهارت بازنمایی کلامی به صــورت مکتوب به عنوان دومین مهارت ارتقا یافته در میان ۶ مهارت ارتقا یافته در کارگاه های برخط توسط دانشجویان ارزیابی شد. از دیگر نتایج آنست که سطح استفاده و مقبولیت بازنمایی های نوشتاری و گفتاری در فرآیند خلاقیت در کارگاههای برخط ثابت نبوده است و ممکن است به دلایل مختلفی تغییر کند. برخی از مولفه های توفیق این امر عبارتند از: ترجیح مدرس کارگاه برای به کارگیری مهارت بازنمایی کلامی در کارگاه، استعداد و ظرفیت بالفعل دانشجویان در توصیف کلامی، موضوع کارگاه طراحی و موقعیتی که کارگاه در فرآیند طراحی در آن قرار دارد.

نتیجه‌گیری: کارگاه های برخط طراحی معماری، امکانی برای تقویت مهارت بازنمایی کلامی دانشجویان هستند. فراتر از آن، مهارت بازنمایی کلامی، از پایه‌های برپایی کارگاه های برخط طراحی معماری اســت و نقش جبرانی در تامین کیفیت آموزشی کارگاهها به ویژه در فرایند طراحی دارد. از این ویژگی می توان استفاده کرد و در کارگاه های آینده، به صورت حضوری یا ترکیبی بهره برد. پیشنهاد بر این است تمرین هایی هدفمند در این راستا تعریف و تجربه شوند تا در مراحل آغازین و میانی و نهایی فرایند طراحی به کار گرفته شــوند. از این جمله می توان به تمرین بیان ســناریو، بیان صورت مساله طراحی، نوشتن بیانیه طراحی و تدارک جلساتی برای توصیف خوانی از میان متون نویسندگان برجسته و همچنین جلسات نقد کارهای دانشجویان و آثار معماران در کارگاه طراحی معماری برخط اشاره کرد.

Introduction

Based on its nature, architectural education is a significant form of education that promotes ongoing growth. It contains a variety of courses, including theoretical, practical, studio, and internship courses, each of which has distinct features [1]. The design studios, where students test concepts, construct physical models, and present design work in a

collaborative creative atmosphere, are at the center of architectural education [2]. At the beginning of the Corona pandemic, when education was required to be done online, the difficulty of running an online studio was greater than that of other classes because of its nature. At first, it seemed that the online studios were merely keeping the education alive, given the many obstacles they faced, except for the fact that they kept the health of the students under quarantine. But, despite limitations, we have seen some progress over time. Thus, the question of what strengths there are in an online architectural design studio has come to light. By becoming aware of it, one can take advantage of both if it is needed to continue with online or face-to-face studios.

To observe online design studios, noticing the design process is as base. The design process has a wide range of different perspectives and theory frameworks. Some of those views are chosen by architecture schools and implemented based on their visions and context, as well as through human resources. The issue of the representation of ideas and concepts is among the pillars of each perspective on the design process. The concept of representation can be applied in a variety of ways, for instance as evidence that architectural students have taken into account this aspect when designing their work. On the other hand, representation played an important role in this process since it was restricted by content transfer restrictions within online studios. To answer the question, this study has focused on the representations in the design process in online studios. Visual representations are usually welcomed with more energy and power, and they were previously possible in face-to-face studios, but it is hypothesized that there is a new opportunity to use verbal representations (VR) and verbal descriptions (VD) throughout the creative process in online studios.

The description serves as a tool for representation. According to Schultz, description is the expression of the relationships between things in the qualitative context of the world. He is fiercely opposed to using abstract science to comprehend and describe things in the field of education, and he believes that for architectural education, teachers must be involved in the development of the nature of things in the world [3]. Pallasmaa indicates the paradigm shift of attention to the five human senses in light of today's extreme perspective of retinal architecture. He aspires to move away from merely visual space and toward integrated human-understandable spatial dimensions. He cites Rene Spitz as saying that all perceptions originate in the mouth cavity, which acts as the primordial link between inner reception and exterior perception [4]. Antoniades enumerates several strong and valuable descriptions in architecture that have been expressed by architects even before design, and he believes that description as the basis and source of literature is one of the architect's and the instructor of intuitive architecture's inseparable tools [5].

Verbal description (VD) means a statement that represents something in words (oral or written). In specification, VD involves a full discussion of design criteria for a piece of work [6]. According to Ching, a word may encapsulate a thousand images in the mind's eye, just as an image can be more expressive than a thousand words [7]. People utilize VD to make pictures of unknown items [8]. One of the practical instances of image production is the development of a facial sketch by VD from an eyewitness [9]. Human perception verbalizes several notions in VD's imaginative architecture [10]. VD may be programmed for quality and critical element inclusion, and it can be evaluated using two parameters: target details and route information [11]. Alexander

emphasized the need for description in architecture, noting that people support architects by expressing their ways of living in simple language so that they may offer living spaces for life [12]. Salingros takes into account pattern language and form language. Accordingly, each pattern language conveys distinct ways of life for various people in various fields rather is less about images and more about notions [13]. According to Adrian Forty, we have a vocabulary of words to describe the buildings that will finally take shape. He argues that the language associated with modern architecture, such as order, design, structure, and so on, is ambiguous, and that discussing architecture through words is not always intersubjective. He goes on to say that there is a distinction between "talk of" and "talk about" architecture, and that we need to talk about architecture to mean, discuss, and express ourselves [14]. Spatial forms can be stated in a variety of ways, including two-dimensional, verbal (oral or written), and mathematical; whereas functions can be defined in terms of an iconic, kinesics, or other type of system for transcribing and anthropological values that can be described verbally. [9]. According to Holl, architectural work is not viewed as a sequence of disconnected retinal images, but as a completely integrated material, embodied, and spiritual essence that comprises physical and mental structures as well as reinforced coherence and significance [4].

VD has been utilized as a literary allegory, to define characters, to represent and contextualize literary fiction, and to contextualize literary fiction during VR of architectural spaces as plot settings [11]. Another example is the experience of conception through visual and verbal presentation in an architectural design studio, where the confluence of the two is their socializing character [15]. Visual and verbal communication skills are both vital in promoting learning and evaluating graduating courses [1]. People hear verbal explanations to learn about the place in general, and the VD of the building may play an essential role in enhancing the effective navigation of people with visual impairment [16]. When designers express more complicated and abstract spatial linkages or metaphorical notions, the language of VD is affected [17]. VD aids in giving each project a more complete, deeper comprehension and reveals or uncovers areas that the numerical scores do not [18]. One aspect of VD in architecture education is dependent on the student's vision and linguistic abilities (from freshmen to graduates), another is acceptance by persuasion, a third is illuminating, and a fourth is often brief [19]. The strength of the storytelling, the degree of originality, interchangeability, enlightenment about the essence of the project, and the ability to link with design are among VDs desirable characteristics [19]. The dimensions of VD have been presented In Table 1.

Table 1: VD Dimensions hierarchy in design and criticism of case study in the studios [19]

VD Dimensions	Areas	Focused materials	Hierarchy of narrative chains	Kind of product
Reading the building	Forms, texture, color, spatial qualities, Gestalt, details	Shapes, geometry, size, structure, proportion, technical topics	Form, function, space, order	Data
Understanding the building	The essence, the lived experiences	Activities, users, context	Territories, boundaries, margins, centers, edges, paths, links	Knowledge
Understanding the concept aids in the construction	The architect's intellectual equipment, concept	Whys, existence causes	Privacy, thresholds, orientations, stance	Wisdom

Hultzsch stated the function of VD in travel writing and suggested that the ways people verbally describe buildings are inextricably tied to how they look at and make sense of them [20]. The architects, particularly the necessity for adequate abilities in public speaking, which obviously demands coherent technical writing and clear speech, evaluated the verbal technical presenting skill enhancement requirements [21]. One of the second-hand traits that resist VD is sensing, which deals with perception and spatial situatedness [22]. To establish a comprehensive and subjective grading and evaluation method, verbal grade description is advised to be employed in critique sessions in design studios [23]. Based on the importance of designer's thinking, to have an effective shared space for online studios, some experiences focus on students' feedback and discussion with instructor and peers within a critical dialogue relevant to their work through the text, source materials, images, or videos of an interview with a user [24], with some of the dialogue materials reflecting VR. VD may be used at all stages of the representation process by architectural design studios. One of them is how buildings are described in language in case studies [20]. VR, which greatly contributes to design processes, may be extensively employed with supervision, and the study of it aims to uncover the beneficial influence of coordinated usage of diverse modalities on thought-development processes and provide a developmental approach to reflecting designer identity [25].

Review of the related literature

The global architectural profession has been utilizing virtual communication and virtual spaces for over 30 years, promoting global collaboration, idea exchange, and cost savings [26]. Digital tools in architecture have influenced content creation and schools, necessitating adaptation of teaching methods, focusing on studios, distance, and combined education for relevance [27]. Since 1993, distance education in architecture has been introduced [28] but due to challenges posed by studios, this alternative has been rare until the coronavirus pandemic. Therefore, most of the researches in this field belong to post-Corona. Before reviewing the post-corona literature, the pre-corona experiences are reviewed to recover the benefits of distance education in relation to verbal representation skills. One of the concerns that is being advanced in the study of online landscape architecture education is alternate communication tools such as chat, forum, and whiteboard in online mode [29]. In 2011, in a Romanian architecture school, feedback from a distance learning experience was that because students used e-mail to chat, they experienced more writing practice [30]. In 2013, the open design studio model could prepare an infrastructure to contribute to the discussion [31]. During 2015-2018, Loannou addressed some features of delivering online studios that related to language skills and communication [32-34].

A systematic review of online studios' challenges and opportunities was conducted during the COVID-19 pandemic to learn about the consequences for architectural design studios concerning VR. This study suggests three preliminary data classifications relevant to the research questions: What are the advantages of online education, particularly in design studios? What other skills are available in online studios? Are VR skills recognized as a strength in online studios?

As the theoretical aspect is complemented by research in architectural design studios, the written outputs of students are vital to support their design. In a study conducted in the United Kingdom, students found that online

education allowed them to study topics in greater depth and detail and that theoretical work combined with design work was simpler to grasp [35]. Some changes were made when studios transitioned to an unprecedented online format. For example, having students assist with graphic and verbal presentations proved useful in lowering technology obstacles [36]. During COVID-19, 615 undergraduate students studying architecture at Jordanian institutions were polled about their satisfaction with online design studios. The feedback received from students was classified into four categories: learning engagement, learning autonomy, learning quality, and learning behavior. Among these aspects, the following quotations are relevant to the possibility of employing non-visual representation: I prefer to communicate my design work in the form of group or one-on-one interaction, I prefer to get feedback in the form of oral or written input, and I can clearly convey my design without the need of manual drawings or models [37].

Communication is essential in online studios, and when we have meetings with the camera on, the communication is reliant on nonverbal clues, but after the camera is turned off, our interactions are confined to verbal cues [38]. One of the techniques and platforms used in online studios for studio criticism was 'verbal critique only,' which had a lower frequency of usage than 'critique online through drawing' [39]. When architecture students in online studios comprehend the site in a design context, they are limited to audio and visual data gathered from the internet and other people, and verbal statements or writings, as well as photos, play an important role in understanding primary and secondary data rather than in-person observation [40].

Because there were no nonverbal indications in the online studios at times [41], they had to rely on verbal clues. Online architecture education has enhanced educational outcomes by allowing students to find and develop their potential [42]. The findings of measuring human capital resilience and identifying the capacities of architecture students during the pandemic demonstrate that most people were under-equipped with the essential devices, software, and skills to communicate ideas in real time [43].

One of the suggestions for online instruction is based on the concept of verbal redundancy, which states that when utilizing multimedia, auditory verbal explanations should supplement visual materials like text or graphics without being redundant [44]. According to a study of online studios in Turkey, students believe that the use of digital technologies and the opportunity for self-realization make online studios the most advantageous option for continuing education even at a distance [45]. The verbal-linguistic intelligence of students was developed throughout the COVID-19 pandemic, and this outcome may aid us in future alternative learning [46]. Because it was impossible to point specifically to anything on the screen while using digital media in online studios, it was required to communicate verbally to transmit any pertinent information [47]. The activity of listening in, which has been seen during online studios as lurking and valid peripheral learning, has been detected in the design studios. These findings show that informal activities help students and overtly active forms of contact in remote learning [48]. Table 2 shows a summary of the references based on the literature review.

Table 2: The Related Previous Studies

Rows	Reference numbers/ The institution where the online studio was studied	Year	Methods	The findings about the capacity of online studios regarding VR
1	[29] Anhalt University of Applied Sciences, Bernburg and Dessau campuses, Germany	2005	Graduate Programs in Landscape Architecture • Focus on new technology applications. • Monitoring the processes.	Chat is one of the alternate communication tools.
2	[30] Spiru Haret University, Bucharest, Romania	2011	By placing students in the virtual education situation, they monitored the challenges that arose.	Using e-mail to chat, expiring to more writing practice
3	[31] Open University, UK	2013	They questioned if we can create an effective shared space online, and does it scale. They had about 500 students to reach the answer per presentation of the course 'Design thinking: creativity for the 21st century'.	Contribute to discussion
4	[33] School of Architecture of the National Technical University of Athens	2015	They described an experimental configuration of multiple learning environments in diverse mediums for an undergraduate design studio	Exploring Studio Boundaries • Creating a collaborative environment. •Facilitating communication and knowledge exchange.
5	[32] National Technical University of Athens	2017	Monitoring a Blended Course in Architectural Education • Utilizes online and in-class synergy. • Focuses on connectivism model. • Course content redesigned for the new medium. • Encourages student contributions to content. Course Data Analysis: • High participation, exchange, and student satisfaction post-course completion.	Outcomes: • Verbal and visual representations of student endeavors. • Vocabulary of Terminology used as a navigation tool.
6	[34] School of Architecture of the National Technical University of Athens (NTUA)	2018	Impact of New Studio Layout on Students • Analytics, blog statistics, and survey results reveal student involvement in blending. • Blending initially set by tutors, students chose their involvement level.	Studio's Blended Model Expansion • Promoted student connectivity through network-structured communication. • Adopted online modalities and reconsidered f2f meetings. • Redesigned studio as a whole. • Students' involvement in the layout's features is crucial.
7	[46] University Pendidikan, Indonesia	2020	Student Intelligence Development Post-COVID-19 • Examines visual-spatial and verbal-linguistic intelligences. • Investigating supports future learning alternatives.	Mind Map Learning: Enhances Spatial-Visual and Linguistic Intelligence •Connects to images, colors, words.
8	[41] Indian institutions offering undergraduate architecture programs	2020	Online Survey for Educator Data Collection • Gathered structured information on the transition process, and IT/online platforms/tools. • Assessed efficacy of online teaching-learning. • Tracked trajectory of blended learning.	The results convey the need for more engagement with digital tools and representational software on integrated platforms.

Rows	Reference numbers/ The institution where the online studio was studied	Year	Methods	The findings about the capacity of online studios regarding VR
9	[36] Department of Architectural Science, Ryerson University, Canada	2021	• Review of virtual teaching experiences. •Examination of scenarios, surveys, and online studio adaptations.	Teaching Modifications Enhance Student Engagement • Use of graphic and verbal presentations. •Lowers technology obstacles.
10	[37] Jordan universities	2021	615 undergraduate students studying architecture in Jordanian universities were recruited to explore the factors that constituted and affected their perceptions of online design studios.	Online Design Studio Challenges • Potential for non-visual representation. • Offers opportunities for improved user experience.
11	[40] Muhammadiyah University, Jakarta, Indonesia	2021	Study on Architecture Design Students' Site Understanding • Assesses students' comprehension of virtual and secondary data. • Measures understanding using thirteen site attributes. •Evaluates the impact of comprehension on the design process.	Architecture Students' Data Understanding • Dependence on the internet and other sources of data. • Partial understanding of site context. • Importance of verbal statements, writings, and photos.
12	[45] Bahçeşehir University, Istanbul, Turkey	2021	Qualitative Evaluation of Online Design Studio Education • Utilized qualitative approach. • Surveyed first, second, third, and fourth-grade students. •Aimed to understand opinions on online design studio education.	Results show that students think in online studios, they are given a chance to realize themselves.
13	[47] Two parallel programs in Turkey and the UK: Eastern Mediterranean University and Final International University	2021	Study on Virtual Design Studio Evaluation • Examines 360 students from eight studios. • Evaluates effectiveness in learning outcomes. •Discusses evaluation process for final design projects.	Verbal communication was necessary to convey relevant information, as digital media cannot point at specific points, making the interactive critique of 3D models superior.
14	[38] Human-Centered Design, United States	2022	Trying to find the best way forward — balancing these changes and defining a "new normal", Corgan released its report.	Effective communication is crucial in online studios, as meetings rely on nonverbal clues during camera-on times and oral cues during camera-off times.
15	[44] School of Education, University of New England, Australia/ Department of Education, Utrecht University, The Netherland	2022	"Optimizing Online Classroom Learning" • Based on educational psychology research. • Generalizable across age groups and learning areas. • Bridges cognitive load theory and self-regulated learning research.	Online Instruction Suggestions: Verbal Redundancy • Use auditory verbal explanations to supplement visual materials. • Avoid redundant explanations.
16	[42] Hasan Kalyoncu University, Turkey	2022	Pandemic's Impact on AE • Systematic literature review and bibliometric analyses combined. • Extracted relevant documents from (WoS) database. • Explored bibliometric connections between AE and COVID-19. •Conducted content analysis.	Online architecture education has enhanced educational outcomes by allowing students to find and develop their potential.
17	[43] College of Architecture, University of Santo Tomas, Manila, Philippines	2023	They aimed to measure human capital resilience and identify the capacities of architecture students during the pandemic.	Most people were under-equipped with the essential devices, software, and skills to communicate ideas in real time.

Rows	Reference numbers/ The institution where the online studio was studied	Year	Methods	The findings about the capacity of online studios regarding VR
18	[35] School of Architecture and the Built Environment, University of Lincoln, UK	2023	• Examines the effects of blended online learning and COVID-19 on students' writing outcomes. • Compares final written submissions of two-year groups (2019-2020 vs. 2020-2021). •Uses qualitative and quantitative analyses: grades, image, reference, and NVivo word count analyses.	The outcome differs for first-year and fourth-year students. Four-year students could study topics in more depth and detail thanks to online education, and theoretical work paired with design work.
19	[39] Sir Syed University of Engineering and Technology, Karachi, Pakistan	2023	Online Studio Pedagogy in Pakistan: Analysis and Feedback • Analyzed webinars, documentation, and interviews. • Collects student feedback on online or physical studio. • Uses SPSS to correlate variables.	Online Studio Criticism Techniques • Verbal critique only. •Utilizes various platforms.

According to the literature summarized in Table 2, the methods used are classified into three categories: qualitative, quantitative, and mixed, with the percentages of qualitative and mixed being higher than quantitative. They all reviewed the relevant literature, and some did it systematically. Most of them had hands-on experiences at the institutions where the educational programs were delivered. In case studies, data collection includes monitoring, coding behaviors, memos, using questionnaires to obtain feedback from instructors and students, and so on. They debated and used content analysis, statistical descriptions and charts, comparisons of two or more groups or circumstances, and interviews with architectural education audiences to assess the results. In sum up, based on the literature reviewed, online studios had four main areas where they excel that might be used to create a conceptual model: 1) Verbal redundancy; 2) The improvement of students' written work; 3) Relying on listening media; and 4) the development of certain instructors' and students' non-visual and visual skills (Fig. 1).

Method

Participants

During the research period for five academic semesters (2019-2022), 12 online studios of Shahid Beheshti University were observed. Five separate studios in both the bachelor's and master's programs offered variation in terms of studios. Some of them repeated longer than one semester. The basics of Architectural Design have been taught twice. Architectural Design 1 has been delivered three times. Architectural Design 4 has been taught once. Architectural Design 5 has been taught twice, and Final Architectural Design has been taught four times. Two architectural design studios from the master's program—studios 1 delivered twice and 2 delivered once. There were typically 12 students in each studio. The statistical population was chosen since they were students at the studios where the authors were instructors. In sum, 147 students participated in the study 111 of whom were undergraduates and 36 of whom were postgraduates. The comments of 14 colleagues in the architectural department were also used.
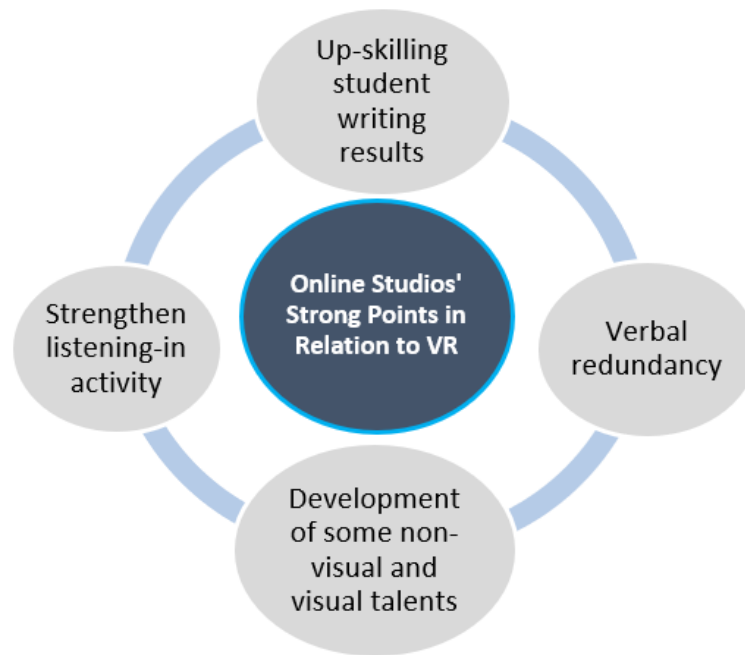
Fig. 1: A conceptual model of the advantages of online studios for VR

Instruments

The case study section has been carried out through thematic analysis supported by coding employing tactics such as observation, memos, student output evaluations, questionnaires, and self-assessment by students. The questionnaire with open-ended and closed-ended questions was provided via email to all of the participants who were students. The thematic grouping of questionnaire responses is typically summed up in 5 issues: 1) Concerns around the requirements for student attendance in online studios, 2) Inquiries about the thoughts of students on the complex interactions between peers and instructors in online studios, 3) Concerns regarding the studio program, procedure, end result, and assessment. 4) Concerns regarding the visual and non-visual abilities needed by students in online studios, as well as their development or lack thereof; 5) For online studios, open questions about anything they deem significant. The Likert scale has been used to ask some of the questions. During the pandemic, another tactic for obtaining codes

was to contact colleagues via social media and Adobe Connect sessions.

The studied studios were delivered online through the Adobe Connect platform. The WhatsApp social network was utilized for both simultaneous and asynchronous communication during or after the sessions. Communication at the studied studios depended on multimedia ways such as whiteboarding, photograph sharing, and indicating works using architectural modeling software such as SketchUp and Revit, in addition to verbalizing experiences. There were five regions of information absorption in the present content analysis: 1) Any oral exchanges or written communications sent via social media/LMS/email by an individual or group that pertain to the interaction between instructors and students during online studios, 2) Questionnaires, 3) Any feedback of student, such as verbal or behavioral, depending on participation and active presence to absences and lack of participation, 4) The quality and quantity of the work completed by students, 5) Task characteristics that educators specify for

students include quantity, quality, and form. Up to theoretical saturation, data gathering was done using the aforementioned tactics. We utilized content analyses to examine codes produced from lived experience. The measurement tools have been derived from the data collected related to the students' outcomes. This allowed comparisons to be made between the first semester and the next semester. Another criterion for comparing the outcomes of students was the start, middle, and end of each semester. In this manner, every piece of data was taken from online studios. However, because the authors had previously worked on VR in architecture education before Corona, they had a notion of the VR abilities of architecture students generally, and their prior experiences were taken into account as assumptions in this study. The studios that were conducted more than time during the Corona era provided for a more precise and close comparison of the academic results of the students.

Procedure

In the literature review, a systematic review of online studios' challenges and opportunities was conducted during the COVID-19 pandemic to learn about the consequences for architectural design studios with respect to VR. The scope of the search included scholarly journal articles, and the publication period was limited to 2019 to 2023, based on articles identified using Google Scholar, WOS, and Scopus database searches, and relevant to the keywords 'online architectural education' AND 'opportunities' AND 'Covid-19'. Alternative spellings, synonyms, and similar phrases were used to restrict the search. Only English-language articles were included. Proceedings, book chapters, internet sources, and books were used to elaborate on the research topics and aims. Full articles were included, however,

only abstracts or presentations were removed. Using the search string, 117 entries were retained after filtering. After that, we searched the articles using the keywords 'online studio' AND 'skills' AND 'verbal representation' AND' verbal description', and only around 19 records remained. To extract data from primary publications, this study suggests three preliminary data classifications relevant to the research questions. All of the papers reviewed highlighted the obstacles and limits of online architectural education far more than the benefits and opportunities. Because the current study intends to continue the search among the strengths, the strengths connected to VR have been focused and analyzed.

Along with the techniques used to collect student feedback in the case study, we observed online studios in the following areas: activities/steps/creativities, knowledge, procedures/methods, individuals/groups, and instruments. Each of these dimensions is investigated with an emphasis on representation. More specifically, we analyzed the quantity and quality of outcomes produced by students in connection to VR at each level of the design process. The following steps are often engaged in the architectural design process and we followed them: Preparation and preliminary processes include a) addressing the design challenge; b) programming; c) site analysis; d) case study; e) etude of alternatives; f) analysis of alternatives; g) selecting on the best alternative; and h) developing the layout. The documentation was based on a running log of student feedback throughout the semester, as well as their performance in the studio and end-of-semester submissions.

Design

The questions raised about the strengths of online architectural design studios in relation to

verbal representation, utilized a research design to carry out this study (Fig. 2).

The research method is qualitative with a dual basis. One side refers to a literature review that comprises an overview of VR and its tool, called VD, as well as a synopsis of the available research to highlight the major benefits of VR acquired from online studios across the pandemic. Coding was utilized to investigate and analyze data linked to the research issue in the case study where the authors demonstrated their experiences as online studio facilitators using an autoethnographic strategy. Based on the literature review, a conceptual model with four characteristics for online studios' strengths concerning VR was developed. The lived experience built into some more aspects of the situation. The findings of those two actions, as well as discussions about the findings, guided the research to its conclusion.

Results and Findings

Tables 3 and 4 display the questionnaire responses. Table 3 lists some codes that deal with circumstances where applying VD more often than usual was necessary. especially in the tutorial and discussion phases of the design process.

Table 4 shows the students' perceptions of their skills. "What was the level of the student's skills at the end of a certain online studio?" in response to another question comparing their skill level to earlier, they stated that six of their nine skills have significantly improved. 3D modeling (96%), drawing (92%), writing the documents (86%), sketching (75%), oral presentation and verbal description (73%), and participation in group communication (57%). Their three skills, however, had deteriorated: Making maquettes (63%), hand sketching (60%), and giving comments in the studio/extracurricular (48%). In comparison to the previous skills, no one addressed the following: 3D modeling, document drawing, hand drawing, and sketching. 10% of the participants rated their VD skills as poor. 9% said they were bad at hand drawing and 13% thought they were weak at producing maquettes. This is despite the fact that in skills such as 3D modeling, providing feedback to the studio on the training, and drafting papers, nobody gave her/him a zero grade.
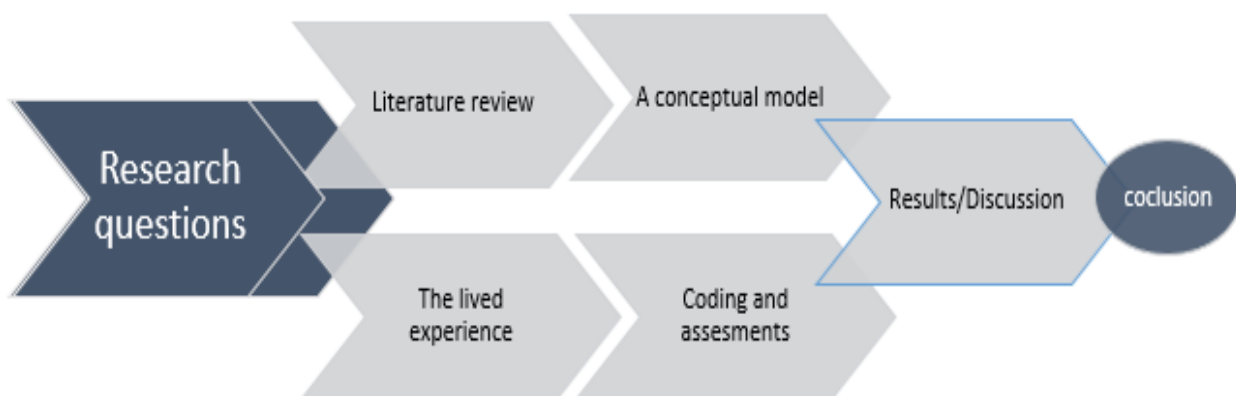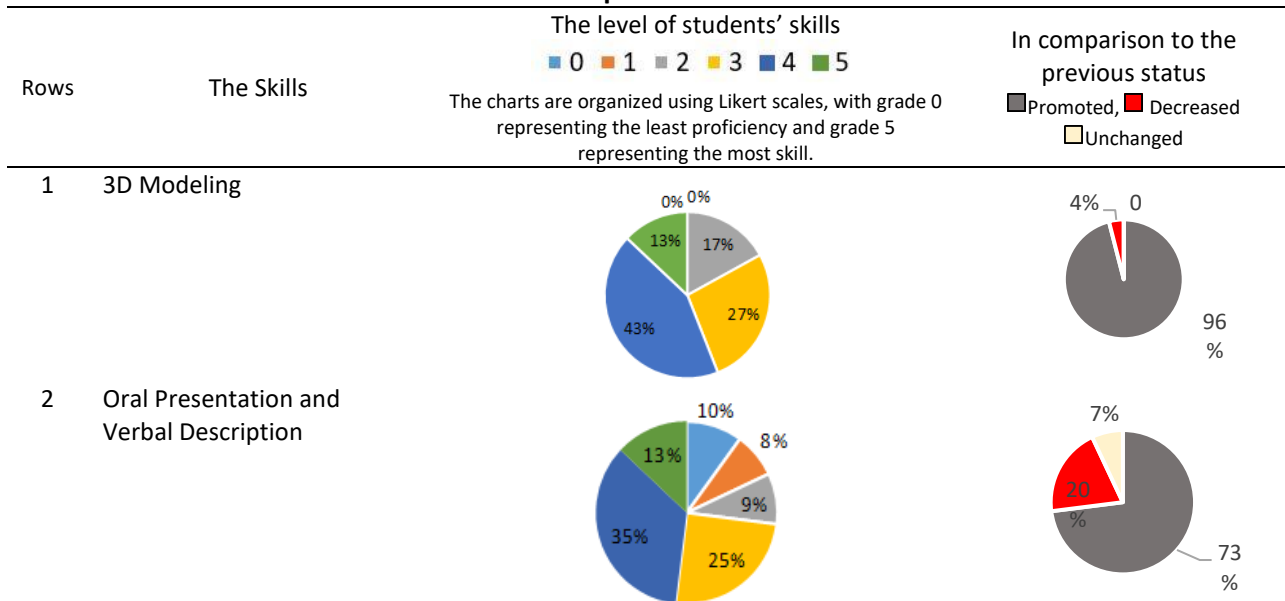

Fig. 2: Research design

Table 5 shows the views of the architecture department's colleagues. Based on the content of Table 5, several VR-related codes and phrases have been retrieved. Some elements include, for example, recognizing the relevance of VR in online studios, recovering VD as a vital content transfer technique for online studios, and emphasizing the need to generate practice circumstances in online studios to enhance VR.

Table 3: Example statements from participants on VR skills in online studios

Rows	Students' quotes	Codes related to the VD
1	Before Corona, we used to draw first, and if my sketching was poor, I would provide explanations and utilize class objects, models, and hand gestures until I could address the ideas and concepts. Unfortunately, doing so proved tough in the online studios. However, every one of us strives to compensate for this deficit. For instance, we increase the number of drawings. For 3D rendering, we largely rely on software. We also provide more in-depth verbal descriptions of our work.	More VD in online studios is required as a compensating skill.
2	We attempted to speak in a more edited manner in the online studios because the classes were recorded.	Make a revised speaking situation.
3	In the portions of the session where there were theoretical talks, I asked myself what would be added if this meeting were held in person, and I tried to fill in the gaps as much as I could. Most of the time, I didn't feel much different from the face-to-face studio, and I didn't sense the distance, and I was happy with the interchange of ideas I had with classmates.	highlighting the original position of VD and VR in-studio discussion meetings during the design process
4	The studio was recorded; it was good, and I had the opportunity to listen to the class's voice again to better comprehend the content.	Having the studios broadcast even with the voice that communicates the significance of words.
5	The most significant thing to me is that, despite their hectic schedules, some instructors let us leave notes for them in PV. It meant a lot to me that they took the time to react to our messages.	The significance of maintaining verbal contact outside of the studio

Table 4: Students' self-assessment of their competence level in online studios vs. face-to-face studios

Rows	The Skills	The level of students' skills ■0 ■1 ■2 ■3 ■4 ■5 The charts are organized using Likert scales, with grade 0 representing the least proficiency and grade 5 representing the most skill.	In comparison to the previous status ■Promoted, ■ Decreased □Unchanged
1	3D Modeling	0% 0% 13% 17% 27% 43%	4% 0 96%
2	Oral Presentation and Verbal Description	10% 8% 13% 9% 35% 25%	7% 20% 73%

Rows	The Skills		The level of students' skills ■ 0 ■ 1 ■ 2 ■ 3 ■ 4 ■ 5 The charts are organized using Likert scales, with grade 0 representing the least proficiency and grade 5 representing the most skill.	In comparison to the previous status ■ Promoted, ■ Decreased □ Unchanged
3	Participate in group communication		4% 3% 14% / 21% / 36% / 22%	5% / 38% / 57%
4	Making comments in the studio	In relation to the course	0% 3% / 8% / 37% / 23% / 29%	10% / 46% / 43%
		Unrelated to the subject of the course	5% 5% / 24% / 32% / 21% / 13%	15% / 48% / 37%
5	Document creation (drawing)		0% 0% / 7% / 16% / 61% / 16%	8% / 0% / 92%
6	Creating the documentation (writing)		3% / 8% / 10% / 19% / 35% / 25%	7% / 7% / 86%
7	Making a maquette		10% 13% / 13% / 16% / 18% / 30%	3% / 3% / 63%
8	Hand drawing		12% 9% / 17% / 17% / 13% / 37%	0% / 60% / 40%
9	Sketching		3% 6% / 14% / 17% / 25% / 35%	25% / 0% / 75%

Table 5: Examples of colleagues' comments on VR skills in online studios

Rows	The colleagues' quotes	Codes and Statements
1	Students' and educators' ability to implement VD has increased in comparison to before.	The significance of having VR in online studios and upskilling it
2	We have a tutorial WhatsApp group in which it is prohibited to insert a voice to practice writing better and more precisely.	Creating possibilities for practice in online studios to develop VR skills
3	When the internet was poor and we couldn't use cameras or send photographs, we relied largely on sound. As a result, in those sessions, all material was conveyed through words.	The restriction of having just sound as a form of content transmission
4	Regardless of the amount of ability of various instructors to utilize VD, they were forced to employ this material transfer way in online studios more than ever before.	VD is an important content transfer approach in online studios.
5	Essentially, issues dealing with the description of life and the representation of human experience in architecture created a place for VD to play an essential role in the design process. This issue was already present in non-online studios, but it became more palpable in online studios due to the limits of transferring concepts.	The design topic has an impact on the amount of VD used.
6	The duration of the online studios was limited in relation to the quantity of work that had to be completed, and it was necessary for students and instructors to connect with extra tutors outside of the studio. As a consequence, images, papers, and text descriptions of the items were used to share them. Therefore, writing became increasingly interwoven into the whole design process.	The importance of incorporating text into visual materials

Table 6 summarizes the author's direct involvement in developing the online architectural design studios. According to Table 6, the function of VR has influenced each step in the design process; however, certain processes have been affected more than others. Site analysis and client and user recognition, discussion for the design problem and topic, design statement and scenario, group tutorials, and written and oral presentations are the most frequently associated with VR skills. When compared to the two stages of the greatest and least usage, it appears that the amount of application of VR abilities in criticism, judgment, and evaluation is in the middle position. In general, compared to the pre-online studios' condition, online studios' reliance and demand for VR had risen to some amount.

Table 6: Examples of codes connected to VR competence in the process of creation in online studios based on authors' experience

Rows	The authors' remark	Codes and Statements	Placement in the design process
1	More than in-person studios, it was possible to accomplish tasks like reading descriptions provided by others in relation to the design themes.	Practice is important for improving our VD. It's helpful to write the design statement. It is helpful to express the design topic's core ideas. Expressing recollections and firsthand experiences from locations relevant to the project's theme might be beneficial.	- Case studies criticizing - Site analysis - Spatial programming - Knowing your users - Presentations - Discussion - Expressing design statement

Rows	The authors' remark	Codes and Statements	Placement in the design process
2	The students did a good job of using words and writing to convey the scenario, and generally speaking in the online studios, it appeared that the students relied more on words in the initial sessions. Nevertheless, several of them chose the form vocally before sharing the non-verbal version with the class.	In the studio's initial sessions, the verbal presentation took precedence over the visual display.	- Writing the scenario - A description of the forms that are utilized
3	The students' expressive techniques differed from one another, and this was one of the interventions. On the other hand, each student's hand sketching strength varies.	Different levels of VD and hand drawing skills should be evaluated because they are complementary.	- Rhetoric situation [49] - Judgment - Saturation in design decisions - Etudes - Alternative generating
4	Due to the limits of online studios, to keep the studio dynamic and to avoid becoming boring, and the majority of the students could participate, the tutorials were held jointly most of the time.	In non-individual tutorials, after analyzing an example of the student's work, instructors gave generalizable suggestions for all students in the form of vocal descriptions in collaboration with the students.	- Non-individual tutorials - Providing advice, avoidances, and design guidelines
5	Due to the need of continual assessment in online studios, delivery continuity occurred multiple times throughout the semester. As a result, the students' recording of the procedure rose.	As some tasks had to be self-explanatory with the option of verbal explanations, the quality and quantity of the outputs were critical.	- The procedure - Continuous evaluation - The product - Presentation - Delivery - Assessment
6	The use of VD proved effective for the design problem. For example, in dialogue about 'housing design,' professors, students, and even studio guests had a greater need for VD.	The progress of some design problems is more closely tied to VR skills.	- design problem solving - design scenario - programming - design development
7	Site analysis, customer demands, and user requirements were all confined to communication via the virtual platform.	Online interviews with clients or users necessitated the application of linguistic skills. During site visits, students presented their findings visually and vocally to their classmates.	- visiting the site - visiting the cases - meeting with the client/the users - site analysis
8	Individual tutorials via e-mail or social media, as well as the number of words related to photos to explain them, have surged in popularity among students.	Individual design process evolution necessitated the distribution of a piece of explicating text completing the images.	- Individual tutorials - Developing design

Discussion

Based on Fig. 1, the conceptual model collected from the systematic review, four areas were stated as strengths of online studios in connection to VR skills. Three areas in the conceptual model are also proven in the actual lived experience. However, in the case of the

fourth category, which is about upskilling VR of students and professors, the current research could only focus on students and did not explore instructors' skills. As a consequence, the results are consistent with the literature solely in the aspect of enhancing students' VR skills. In the current study's lived experience, it was discovered that by depending more on voice, modifying speech, and attempting to overcome the constraints of online studios, the possibilities afforded by VR skills were employed more. Another requirement in online studios that had a direct influence on the advancement of VR was the necessity to write down comments and assignments. They highlighted the focus on more edited writing and even enhanced students' writing abilities. The exchange of viewpoints was done on social networks as a supplement to the studio, and the students were forced not to share their voices and write their comments, these experiences also helped to enhance their writing.

As stated in the results section, there was a need for verbal presentation and representation skills throughout the design process: in some early stages such as scenario statement, site analysis, and programming, in the middle stages such as ideation and generating alternatives, and in the final stages such as discussing and judging the works. As a consequence, in response to the current research question, one of the most notable triumphs of online studios was the development of VR skills, due to the constraints of using photographs, three-dimensional volumes, and the limitation of employing body language. Students' VR abilities increased when compared to face-to-face training, both verbally and in writing. According to the research findings in the self-evaluation section, the improvement in writing was somewhat more than in vocal expression. However, this

result is debatable, and more research is needed to determine this issue.

Essentially, online education is challenging during the pandemic, and it is even more difficult in some disciplines that are not word-based and are dependent on experience and skills [50]. It is important to recognize the architectural design studios in regard to being word-based or hands-on, according to different stages of the design process. As a result, despite the limitations of online Hands-on education, the word-base feature of the design process assisted online studios in doing the word-base portion as effectively as possible with the support of VR skills, compensating for the non-word base feature. There is no literature that contrasts with the conclusions of this article, however, there are some studies that have similarities with the current study's findings, which will be discussed below. According to Hasanuddin University in Indonesia, the usage of various communication skills in virtual space has boosted the capacities of instructors and students in numerous dimensions such as writing, performing, and visual goods [51]. The research was undertaken at certain Jordanian university architecture faculties regarding moving learning from the traditional mode to online studios as a new norm to respond to the crisis known as the Covid-19 pandemic, one of the conclusions of which is as follows: Students might obtain judgment comments and writing from the teacher regarding their work, which is highly suggested for future encounters, particularly for new students [52].

Researchers from Turkey and Spain analyzed the highlighted requirement to fulfill a platform for establishing online studios by comparing the processes of online education in the two countries. They achieved five components in their study by going via two

separate schematic pathways for two colleges from the listed nations, the first of which is efficient use of language [53], which is consistent with this research conclusion. We should observe the effective use of language in practice VD in online studios so that we may focus on the substance of the studios from a different perspective. This suggestion is consistent with the study, which found that much of the existing research on online education is based on face-to-face content, is not focused on topic areas, is based on a post-secondary audience, or fails to incorporate data from instructors themselves to triangulate conclusions [54].

Conclusions

According to the article, online architectural design studios have the potential to upskill architecture students in every stage of the design process. The opportunity may be presented in both written and oral form. Furthermore, one of the foundations of providing online studios is the capacity to convey ideas properly via language, which also serves as a compensatory function during the design process in sustaining the studios' quality. This capability is critical for programming and delivering online studios. Using Verbal representation and trying to improve it creates a soft educational infrastructure that has some affordances: the possibility of using it in hybrid, online, or face-to-face studios and addressing tasks for the early, middle, or end of the design process.

Some issues about the study's practical consequences and applications might be stated: The first stage is to pay close attention to how language and words may help advance the educational process in architectural design studios, whether online or in person. In the

next phases, and especially in online studios, specific assignments based on the value and efficiency of VR, both in written and oral form, must be included in the studio schedule. Some activities, such as reading descriptions of structures by notable authors, might be instructional events in online studios. To include tasks to enhance VR skills, instructors should consider what stage of the design process they are at and how much potential and opportunity each step provides for including such tasks. Because not all stages of the design process are equally open to improving VR skills. For example, in the early phases of the design process, we may specify certain duties related to the design problem, define the design scenario, the writing of the design statement and manifest, and the recounting of the lived experience from the perception of the design site. Verbal presentations of alternatives, in addition to nonverbal presentations, might be valuable in the intermediate steps of the design process. Furthermore, when referring to case studies, criticism of them is heavily reliant on VR. Finally, at the end of the design process, during the student presentations, and the jury discussions, there is a fantastic opportunity to improve VR Skills.

According to the research, the level of usage and acceptability of written and oral communication in the creative process in online studios has not been consistent, and it may alter for various reasons. Some of these successful characteristics include the instructor's preference for employing verbal description and verbal representation in the studio, the student's potential in VR, the theme of the design studio, and where we are in the design process.

There are various constraints that the authors faced when doing the research. One of the obstacles was a lack of literature on the

issue as outputs of online studios at the start of the research since they had not been published and other researchers were conducting at the same time. There were a few references to distant design studios before Corona, and they needed to be more compatible with what we experienced throughout the Corona era. As a result, it was essential to rely on firsthand experience, and after some time, the option of incorporating the findings of other researchers could have been considered. In addition to this constraint, we had no prior experience with online studios before the pandemic. Among the other intervenors was the variation in a priori and a posteriori impression of online studios for different student groups and levels. Among other constraints, the emotional and physical circumstances of trainers and trainees in online studios should be considered. Another constraint is that it was not able to compare parallel face-to-face studios with the current research during the pandemic.

This study is the topic's volume zero, and it might be developed throughout time and in other faculties for different studios and students. As a result, one of the recommendations for future study is to investigate the issue in various educational environments to learn more broadly about linguistic capacities and VR skills in architectural studios, particularly online modes. In this situation, a portion of the background characteristics that aid in the development of VR abilities may be retrieved. In addition, we may leverage the current study findings in hybrid studios in its online component to gather further input from its audiences and users and use it to validate the findings. Furthermore, if we can set up a situation in which we have two categories of online and in-person studios running at the same time, we could compare the two groups in deeper studies.

Authors' Contribution

The ideas, execution, article writing, and data analysis are all the responsibility of the first author, Hossein Pourmehdi Ghaemmaghami. The writing was also worked on by the second author (corresponding), Azadeh Khaki Ghasr, who had collaborated with implementation support for the study.

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Conflict of Interest

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AUTHOR(S) BIOSKETCHES

Hossein Pourmehdi Ghaemmaghami is an assistant professor in the Department of Architecture at Shahid Beheshti University. Architectural education and the connection between architecture and structures are his interests and areas of research.

Pourmehdi Ghaemmaghami, H. Assistant Professor, Department of Architecture, Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran

✉ *h_ghaemmaghami@sbu.ac.ir*

Azadeh Khaki Ghasr is an assistant professor in the Department of Architecture at Shahid Beheshti University. The focus of her research is on architectural education, theoretical framework in architecture and housing.

Khaki Ghasr, A. Assistant Professor, Department of Architecture, Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran

✉ A_*khakighasr@sbu.ac.ir*