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The connectivist design studio

Miroslava Petrova, Universidad de Monterrey, Mexico

Abstract

The design studio is the core element in the design curriculum where students gain key knowledge and skills. Typically implementing a project-based approach, it is characterised by learning by doing, collaborative learning and a prominent studio culture. The traditional notion is that the social domain of the studio has a counterpart in the physical environment. However, with the pervasion of information and communication technologies, the design studio was inevitably transferred to the digital realm. When the traditional face-to-face studio had to be transferred to an online modality enforced by covid-19 pandemics, re-conceptualization of the structure was required in order to ensure the quality of the teaching and students' satisfaction. Based on the premise that the contents should not be simply adapted to an online version but an entirely new learning experience should be created, the redesign of the class was inspired by the principles of connectivism (Siemens, 2005). Connectivism as an alternative learning theory recognizes the societal shifts and the impact of technology on the learning processes. This new framework for understanding learning, states that knowledge is derived externally of the individual through a process of connecting nodes and patterns recognition.

The paper explores the potential of connectivism applied in two online design studios at the University of Monterrey, Mexico. It describes the structure of the course and the results obtained in the online learning environment. The outcomes are verified in a survey on the perceptions of the students about their satisfaction and the effectiveness of their knowledge acquisition.

Keywords:

Connectivism, design studio, online design studio, online learning environment, learning experience, knowledge creation

Introduction

The digital realm of the 21st century profoundly changed the design process and inevitably influenced teaching and learning. Among the priorities of design education is to prepare students for the challenges of the profession in the new reality. To provide the necessary knowledge and skills to deal with the environmental complexity while ensuring positive learning experience requires constant evolution and implementation of new methods and practices in the learning process. Recognizing that learning today is done through networks and that "[k]nowledge is "not a "thing," or a system, but an ephemeral, active process of relating" (Stacey, 2003), connectivism is advanced as a relevant theory to aid pedagogy and its successful adaptation to the digital context. The aim of the paper is to explore the potential of connectivism applied in two online design studios of the interior design undergraduate program at the University of Monterrey, Mexico. It describes the structure of the course and the results obtained in the online learning environment. The outcomes are verified in a survey on the perceptions of the students in regard to their satisfaction and the effectiveness of their knowledge acquisition.

Background

From Beaux-Arts and Bauhaus to the virtual design studio

The design studio is the core element in the design curriculum where students gain key knowledge and explore their creative skills (Salama, 1995). Originating in the Ecole des Beaux-Arts in Paris (1819–1968) the architectural atelier is where students learn to design. It was run by a patron, an experienced master architect, who would guide students how to improve and develop further their designs, and transmit his theories of architecture while discussing their drawings. Just as important was the co-learning which occurred between the students. They exchanged ideas and shared their knowledge in preparation for the annual competition Grand Prix de Rome which was an essential part of the architectural education. The new and old members of the atelier constantly helped each other – the old ones criticizing the work of the new ones, who on their part assisted the seniors with the execution of their drawings. The relationships between the patron and the students were friendly, combined with respect and reverence (Chafee, 1977).

The other pedagogical concept which impacted the structure of design education worldwide was introduced in Bauhaus (1919–1933). After successful accomplishment of the preliminary course where students were introduced to the fundamental elements of design, they enrolled in a specialized workshop by their choice (furniture, pottery, weaving, stained glass, sculpture, metal, wall-painting, theatre). The founder of Bauhaus Walter Gropius described the workshops as “the most important part of our preparation for collective work.” These “laboratories for working out practical new designs for present-day articles and improving models for mass-production” were run by two masters – a craftsman and an artist, ensuring that the student would acquire solid technical skills to deal with the material as well as artistic skills to master the aesthetic form of the product (Gropius, 1965). Though becoming a stage of numerous conflicts of the ambitions, beliefs and convictions of the leading masters and their apprentices, the educational experiment was very successful in creating a democratic community. It recognized the equality of the various crafts and gave everyone the opportunity to be liberated and grow anew as a creator of the new age through unifying technology and art (Forgacs, 1995).

Certainly, the implementation of the structure and pedagogy of these antecedents in the design curricula has undergone many changes and adaptations through the years to respond to the current needs of the society and its value system. However, their main elements – learning by doing and collaborative learning are retained to this day. Typically implementing a project-based approach, the studio is where students “express and explore ideas, generate and evaluate alternatives, and ultimately make decisions and take action” (Gross & Do, 1997).

Through the critical dialogue that is established and the provided feedback, students test the validity of their ideas, and constantly try to improve them. In this constant process of experimentation and revision, learning occurs through reflection of the relation between the action and the resulting outcomes. This “reflection-in-action” as Schön defines it (Schön, 1987), is particularly important for knowledge acquisition. Students learn how to articulate the experience, how to control the process and eventually to become independent in taking decisions. Another aspect of these activities is that they occur in certain social context and hence they are not bound to the individual but involve collaboration (Bruce &Bloch, 2012). In the studio environment, students interact with the instructor and their peers and not only learn

how to communicate both verbally and visually their own concepts but also listen to the viewpoints of the others thus gaining new understanding of the problems discussed.

To generalize the important role of the studio in architectural education, Ledewitz summarizes that it provides teaching of new skills (visualization and representation among them), new language of designing where the verbal and non-verbal dimensions are interlinked (Schön , 1983), and architectural thinking, characterized by a specific for the profession approach to problems (Ledewitz, 1985).

However, central characteristic of the studio is not pedagogy but the interactions that take place and which form the exemplary atmosphere or the studio culture. Wang describes it as “a vital complex of material representation, social collaboration, creativity, emotionality and a tolerance for uncertainty – if not outright confusion – balanced with a faith that meaningful designs eventually will emerge” (Wang, 2010).

The traditional notion is that the social and cultural domain of the studio has a counterpart in the physical environment where students spend long hours, create their own community of practice, and identify with it as individuals and as a group (Spruce, 2007). However, with the pervasion of information and communication technologies both in the design practice and the educational process, the design studio was inevitably transferred to the digital realm. Driven by the growing complexity of the design problems and the higher demand for collaboration between all participants involved in the design process, in the early 1990s the virtual design studio emerged (Radojevic, 2007). The new studio typology offers a computer-mediated collaboration, often between geographically distributed and multicultural teams that is space and time independent (Maher, Simoff & Cicognani, 2012). Though considerably different from the physical space, the virtual studio has the same function as a shared learning and practice space where students interact, develop and present their projects. Furthermore, an important fact is that a sense of place can be fostered (Maher & Simoff, 1999) and hence the identity and the community typical for the face-to-face studios can be successfully retained. A major benefit of the experience in a virtual design studio is that students are exposed to a simulation of the real working environment where expertise in digital media and collaboration in multidisciplinary teams are prerequisites. In the virtual studio students master the new digital tools and develop competences which help in bridging the gap between academia and the professional practice.

Design teaching after covid-19 – in search of a new learning theory

Design education has undergone significant development in the past decades to respond to the technological and social changes and to adequately prepare students for their future career. Digital technology has been extensively embraced by the educational system to facilitate the learning process and to improve the quality and effectiveness of the teaching. Enabled by Web 2.0 online learning brought a radical change in the educational context with its accessibility, independence of time and space and the ability to promote varied interactions with the content, the instructor and the other learners. However, the giant leap to online learning was not a natural result of its advantages but was externally imposed by the covid-19 global pandemic when it proved to be the only possible way for the educational process to continue. University educators were faced with the fact that in the changed setting learning occurs in a

different way. They had to rapidly adapt and discover the new opportunities for teaching and learning afforded by the online environment.

The content of the studio classes I teach also had to be re-evaluated and a plan how to present and transform the information in a relevant way was required. To ensure the quality of teaching and to respond to the needs and expectations of the students, the contents could not be simply transferred to the online version of the class. Instead, the teaching approach had to be fundamentally rethought to propose entirely new experience for the students. Guided by the principle summarized by Laurillard that "[k]nowledge technologies shape what is learned by changing how it is learned," (Laurillard, 2012) the aim was to provide a systematic organization of the content and to plan the class interaction by combining the best pedagogical practices of the traditional face-to-face class with the emerging possibilities afforded by the virtual environment.

To understand the effects of the technological context on education and to support the planning of the online design studio a relevant theory is needed. Determinant factor to be considered is the changing nature of the design process. The commonly accepted notion of its structure consists of two situations – an identified problem that needs to be resolved and a solution which fulfils a certain goal. The transformation from one state to the other, or the causal link between the two situations, is the act of design (Findeli, 2001). From the perspective of systems and complexity theories, Findeli suggests that instead of a problem and a solution, two end states of the system should be considered – its present state and its desired future state which is never a specific solution but a transitory state in a dynamic process. In this new structure, the designer and the user are also considered parts of the system that undergo changes during the transformation process. The awareness of the systematic nature of design requires attention to be paid to the invisible relations that exist between the actors within the system and not on the artifact as an outcome of the design project. This new understanding might be the radical change needed in design education and the design studio in particular which are in a state of crisis (Wang, 2010).

The future designers need to be trained how to deal with the increasing complexity of both the design problems they have to resolve and the design process which often requires a multidisciplinary approach to the design project. To support the acquisitions of skills and prepare them for the challenges of the profession within the context of the fourth industrial revolution, learning should not be focused on the accumulation of knowledge but on the ability to seek for the most up-to-date information, to filter it and to apply it when making decisions. Again, the importance of the relations within the highly abundant and rapidly changing information network and the ability to explore them is prioritized. Hence, the application of systems and complexity theory in learning can provide the demanded framework and foster the required change in education.

In his seminal work "Connectivism: A Learning Theory for the Digital Age" Siemens questioned the viability of behaviorism, cognitivism and constructivism as theories adequately addressing the learning processes in the digital age (Siemens, 2005). He advanced connectivism as an alternative learning theory recognizing the societal shifts and the inevitable impact of technology on learning processes. He reconsidered the relationships between knowledge and the learners in the current social environment and proposed a novel understanding that

knowledge is derived externally of the individual through a process of connecting nodes and patterns recognition. According to connectivism, knowledge is a network phenomenon, composed of networked entities and their connections (Downes, 2010). A major tenet is that knowledge is considered as a function of elements distributed across a system; it is decentralized and may exist outside of a person, which implies that "know where" becomes more important than to "know what" and to "know how." Learning is considered as a continual network-forming process in which knowledge is created through the construction of new connections between fields, ideas and concepts. It evolves from knowledge consumption to a knowledge creation process (Siemens, 2006).

Though the status of connectivism of a theory has been criticized (Verhagen, 2006; Kop & Hill, 2008) its conceptualization of learning accurately reflects the context defined by the online learning environment and the changed student demographics. Thus, its application as a pedagogical approach in the design studio is considered pertinent.

Connectivist learning in the online design studio: the case of the University of Monterrey (UDEM)

Research method and data collection

To study the effect of the implementation of connectivism in an online studio class the case study as a strategic qualitative research method was adopted. The aim is to provide holistic understanding of the connectivist studio through investigating the causal link between what was planned and what occurred as a result, giving priority to students' point of view. The perceptions of the students and their own estimation about the achieved outcomes of the class were examined with several surveys which were carried out before, during and at the end of the semester. The questionnaires were designed to collect both quantitative and qualitative data. To measure students' satisfaction a 5-point Likert scale was used where they could select levels of the statements ranging from very high, high, neutral, low and very low or strongly agree, agree, neutral, disagree, strongly disagree. To provide additional insight on the quality of the applied pedagogy and to discuss the positive and negative aspects of the online studio in comparison to traditional studios open questions were included in the survey where students could express more freely their opinion. In this way the effectiveness of the teaching strategy was verified and valuable recommendations were received on what to change and how to improve the online learning environment. Data were collected from two studios delivered during two consecutive semesters in 2020 and 2021 with the participation of 30 students in total, with 15 interior design students enrolled in each of them.

Context

The studio takes a central place in the four-year undergraduate program of Interior Design at the University of Monterrey, Mexico. From the very beginning of the course of study, students are exposed to studio work which each subsequent semester features a changing focus of the subject and increasing complexity. Successful completion of the previous studio is required for the students to enrol in the next studio and to continue their studies. The first class transformed from a traditional studio into a fully online mode in the autumn semester in 2020 was "Studio Integral." This is the last and most advanced studio which allows students to apply progressive theoretical approaches in the development of a comprehensive large-scale project. It was followed by the "Institutional Spaces" studio for sixth semester students in the spring semester in 2021. At this level of their education, students are already experienced in

developing concepts and using a variety of representational techniques so the main objectives of both studios are to deal with advanced interior design problems. The focus is put on experimentation with various strategies to create innovative and inspiring spaces, satisfying the physiological, psychological, social, cultural and environmental requirements. Special attention is paid to the sociological and technological shifts which are transforming present-day interiors. Furthermore, students explore the experiential aspects of the space and learn how to create a sense of place and memorable spatial experiences.

The major questions considered in the planning process of both online studios were:

- How to minimize the negative effects of transferring the highly practical and dependent on human interaction design studio into the online modality?
- How to plan for effective communication and collaboration in the online learning environment?
- How to engage students and how to encourage a more autonomous and self-directed learning?
- How to ensure meaningful knowledge acquisition in the online learning environment?
- How to support new types of interaction so that the authentic culture and practice of the design studio is preserved?

The first aspect taken into account was the profile of the students. The impact of technology on millennial students' behaviour, beliefs, attitudes and educational requirements has long been recognized and researched with the intention to implement learning activities which are meaningful and conform to their learning needs (Petrova, 2014). However, in 2020 a new digital native generation is in the classroom and though sharing some characteristics with their predecessors, they certainly have their differences. To understand the characteristics and the learning preferences of the cohort it is imperative to support the students through their learning journey and to maximize their engagement in the educational process. Generation Z students are described as observers with a preference for visual and video-based content. They identify themselves as intrapersonal learners who are used to learning in their own setting before sharing their knowledge with others. They focus on acquiring the skills needed for their future career and expect to immediately apply them in real life. Moreover, they feel highly motivated when they are engaged with their passions and when they are involved in social change initiatives (Seemiller & Grace, 2018).

A main goal of the design of the teaching strategy was not to focus on the content but to align the learning outcomes with the proposed activities so that each student is enabled to master competencies while comprehending the value they add for his professional development.

The expected learning outcomes were formulated as follows:

- Ability to implement systematic design approach to solving problems
- Skills to develop and structure a design narrative as a prerequisite for a successful design solution
- Ability to translate conceptual ideas into tangible forms and spaces
- Analytical and critical thinking skills for generalization, evaluation and selection of structures, constructions and materials

- Mindset to apply integrative design approach for sustainable solutions
- Presentation skills and ability to defend concepts and ideas with well-grounded arguments
- Interdisciplinary and heuristic thinking

Contrary to the departmental requirement that the course content should be well-defined and preliminary structured, a flexible program was proposed which could easily adapt to changes and self-organize according to the needs of the students.

Following connectivist principles a variety of perspectives and opportunities for students to connect and to establish dialogue were offered. I relied on the interactions which would be naturally formed and the spontaneous emergence of learning through these interactions.

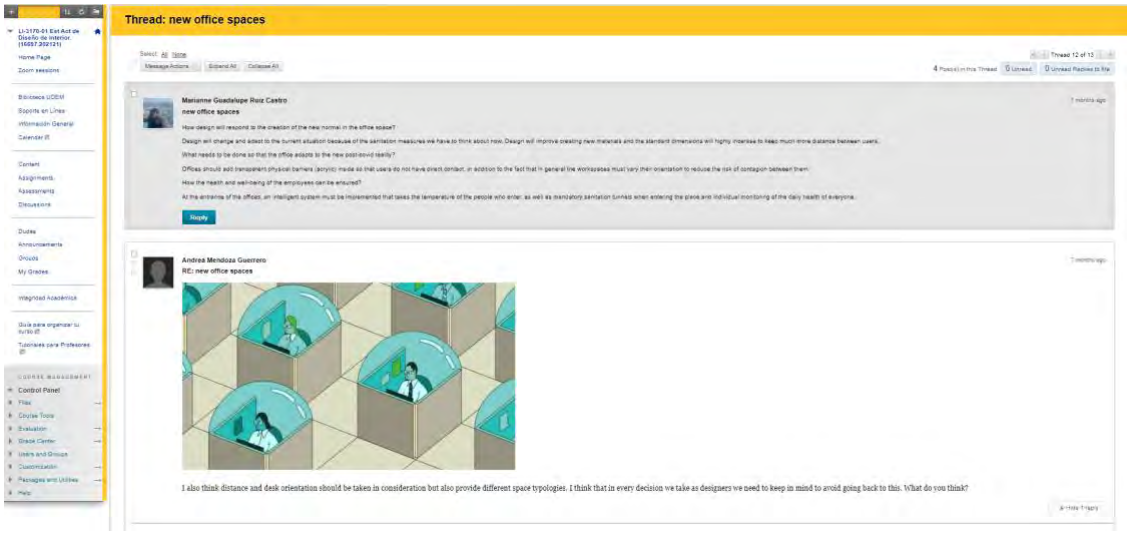
Peer connection is one of the options for learning to occur in the online environment. For example, the first activity in the Institutional spaces studio to define the building typology was intended to encourage students to work collaboratively and to create understanding of the topic together as a group. The use of the online whiteboard platform miro.com allowed the teacher to monitor the work of the students, to pose additional questions for students to consider and to suggest hints if doubts occurred (Figure 1).

Figure 1. Mapping the institutional space – collaborative peer activity to discover the typology of institutional spaces using miro.com as an online platform

The didactic content was not hierarchically structured but instead was split into small segments that could be easily re-arranged and personalized according to the prior knowledge and individual interest of the students. The theoretical lectures, additional readings and videos supporting the concepts which were to be explored in the design process were uploaded on Blackboard – the learning management system adopted by the university, for students to review at their own pace. At the same time, students were encouraged to research these concepts further, to collect reference materials and through reflexion and self-critique to move from observation to interpretation. A major premise in this teaching strategy is that the students are responsible for their own learning. However, in general, they are accustomed to

receiving precise instructions and prefer to be guided in the development of the assignments. To prevent them from getting lost in the massively abundant information and to create a feeling of security, the synchronous sessions in the beginning of the semester were devoted to creating an atmosphere of trust and confidence. The provided nodes of theoretical content served as guidelines for the initial building of a personal knowledge base while the online discussion forums resolved doubts and supported students in the process of self-directed autonomous learning (Figure 2).

a)



b)

Figure 2. a) Discussion on Blackboard about the design strategies that can be applied to adapt the office space to the new post-covid reality, b) Student presentation with design ideas about the implementation of the strategies

The acquisition of skills to recognize which information is valuable and authentic is crucial for the formation of a sound knowledge base of the subject. Today students are exposed to

excessive amount of information and books or textbooks are no longer the major source of knowledge they use. At the same time, a lack of attention given to the issue of authority when evaluating websites is observed (Rowlands, 2008). To learn how to evaluate critically the validity and relevance of the data they encounter on the internet, students were required to use the electronic services of the library in order to verify the information they encounter on the internet. The identified theoretical concepts were summarized in various mind-maps which were shared between the students for peer and group critique (Figure 3).

Figure 3. Mind-maps representing student's understanding of the theoretical concepts

When understanding of the basic concepts has been developed, students could move on to the next level where through interactions with a new content they could form new connections. The formation of new and unexpected connections between existing ideas and the most up-to-date concepts results in new forms of knowledge and this is the essence of the creative process. Not only analytical and critical thinking but also interaction and discussion are decisive for students to be able to "see" these new connections (Figure 4). The feedback provided by peers and the instructor during the synchronous sessions aided in distinguishing the valuable inputs.

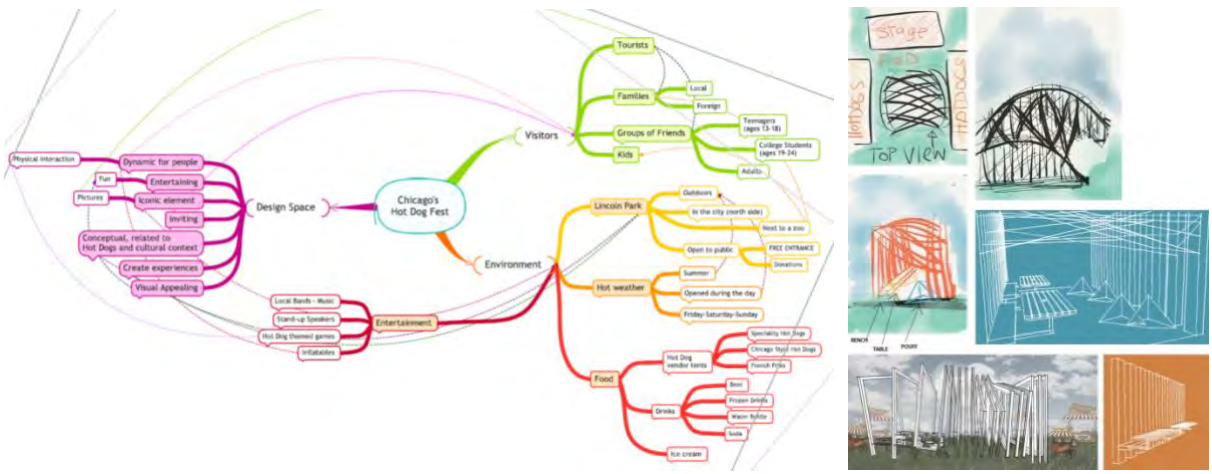


Figure 4. Mind-map exploring the existing relationships between the major aspects considered in a pavilion design and the resulting concept sketches

Another important aspect of connectivism is that students are expected to contribute to the knowledge network by sharing insights and disseminating their own knowledge. Engagement and active participation of each student is expected. In this knowledge co-creation process the main role of the teacher is to curate and sustain the learning environment, to monitor and control its effective functioning, to motivate the self-directed learning and to create opportunities for knowledge sharing. Such an opportunity was provided with the implementation of the Collaborative Online International Learning program (COIL). This virtual mobility experience offered the possibility to interact with students from another country – Universidad de San Francisco de Quito (USFQ) in Ecuador in 2020 and the San Pedro College in the Philippines in 2021. Thus, the online classroom was transformed into a third space (Bhabha, 2004) where "we bring together and negotiate cultures, identities, values, perspectives, relationships, contexts, or ideas from two spaces in an attempt to move into a new space, albeit imaginatively, and create a hybrid space that results from a new creative understanding and juxtaposition of aspects of both spaces" (Ikpeze, 2015). The construction of this hybrid space gave a new contextual meaning to the explored ideas and created new possibilities for creative thinking (Figure 5). Furthermore, by encouraging cross-national dialogue students were able to expand their own networks in a culturally diversified environment.

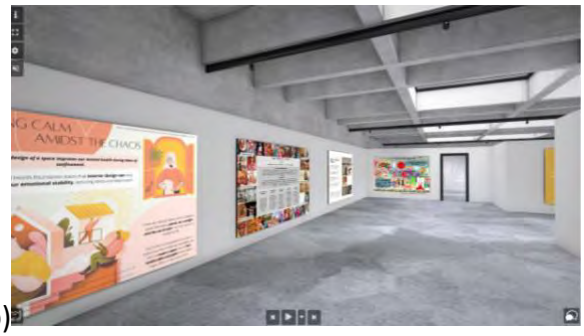
a)  b) 

Figure 5. a) "Creative fragments" virtual exhibition (collaboration between UDEM and USFQ, 2020), b) Online exhibition featuring the results of the COIL research posters using the VR exhibition space on artsteps.com (collaboration between UDEM and San Pedro College, 2021)

Evaluation of the results

Some of the findings of the surveys carried out three times during each semester are presented in the infographic on Figure 6. One of the most satisfying results was that all 30 students enrolled in the two studios found the class to be very well planned and would not change anything in the future. Also, all students replied positively to the question "Did you find the learning in the studio meaningful?" Another survey question addressed the perception of the level at which the class prepares students for their professional practice. 60% indicated a "very high" level, and the other 40% evaluated the level as "high." Likewise, all students considered that their personal achievements in the class as "very high" which was also confirmed with my direct observations.

However, in the answers to the question whether the online studio can replace the face-to-face classes prevail the opinion that traditional classes are indispensable as 83% preferred them. Among the reasons were pointed out that communication is better in person than talking to a camera, because working in front of the computer for long hours has been very tiring, and

distractions occur more often at home. Still, students found a lot of advantages of the online studio. A respondent commented, “I liked the class very much, I think that the teacher understands that the online class is harder for us but she makes it very interesting and useful, also not that difficult, and always supports us.” Another student shared, “Yes, I think the proposed type of learning made us more responsible. We, as individuals, are responsible of our own learning. Learning goes way further than connecting to the class, we have to be present and have the best attitude in order to be able to learn”. Another opinion which summarizes the advantages of the teaching strategy is, “This class has helped me improve my level of organization and my design process.”

An indicator of the success of the proposed teaching strategy is the changed attitude of the students towards the responsibility for their own learning. While at the beginning of the semester 87% responded that they prefer to receive precise instructions how to develop the assignments and only 30% were willing to search additional references and readings not assigned by the teacher, at the end of the semester 28 of the students defined themselves as self-directed learners and two were uncertain. The feeling of belonging to the community was also confirmed by 93% of the students.

Conclusions

One of the findings which require some changes to be implemented in the future is that 77% of the students think that the overload of the online class is higher than the traditional face-to-face class and all of them felt very tired at the end of the semester.

Particularly interesting is the comment from one of the students who shared, “Thank you for caring about our experience with online classes. This is the first time a professor takes the time to ask important questions about this type of learning.” This is found as a big shortcoming because educators should always be aware of the effectiveness of their classes as there is a direct relation between the selected method of teaching and the learning outcomes. And this is especially important to be identified in the online environment which most likely was completely new for the majority of the teachers in the beginning of the pandemic.

At the end of the semester, students were asked to reflect on their own learning and to assess whether they have acquired the skills initially listed as learning outcomes of the studio. The affirmative answers by all students make me consider the implementation of connectivism very successful.

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