Learning through the Experience. The Workshops as a Pedagogical Tool

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Abstract: Often considered informal training, the workshop is a fundamental and complementary instrument for completing the students' learning process. This idea is supported by the literature reflecting that students from architecture and other design disciplines should learn by doing. Therefore it should be used as a compelling architectural pedagogy tool. Construction design workshops allow participants to acquire competencies outside the classroom and some necessary and fundamental capabilities for the practice regarding materiality, technology, construction process, and collaborative skills. The student becomes an active learner determined by experimenting and working collaboratively. The paper analyses the outcomes regarding two design workshops organized in a Chinese university context, addressing the main characteristics of a design workshop linked to organization and participants.

Keywords: Workshop, Architecture, Design process, Teamwork, Pedagogy, Experience.

Introduction

The construction design workshops' format allows an interdisciplinary approach, emphasizing collaboration processes and team dynamics that arouse discussion, interaction, and information exchange among participants. The design and the construction process involve students in a dialogue that requires mutual understanding to find solutions that could solve design problems through creativity. The students establish common objectives with a particular focus on the collaborative exchanges among and across disciplines. These collaborations allow the students to integrate into multidisciplinary teams as a part of their learning process, being an essential qualification to face and achieve future creative independence.

There is a lack of construction experiences in the design study programs in the Chinese context that can be implemented through the completion of construction design workshops that include materiality and construction processes as well as practice-based design research methodologies. Workshops represent an opportunity for team-building and socializing exercises (Baum, 2011) and a potential place for experimentation, enhancing students' learning process. This informal education format enables students to develop personally and professionally by acquiring fundamental design skills (Turgut, 2015).

The paper analyzes construction design workshops' effectiveness as a pedagogical tool in the Chinese context by showcasing two practice-based research workshops.

The construction design workshops are characterized by the collaboration of two design professional practice profiles with a tutor from the Architecture department at Xián Jiaotong-Liverpool University (XJTLU) leading both. One of the professional practices is the Spanish architecture office Zuloark[1]. The other the Taiwanese industrial designer and artist Cheng Tsung Feng[2]. The students involved were Chinese and international students from architecture and industrial design in several stages of their degree in Architecture (from year two to year four).

While developing individual approaches, both workshops address topics linked to design, like structure, materiality, sustainability, or making competencies. The paper attempts to analyze complementary competencies, design approaches, and the importance of interdisciplinary collaboration among teams, seeking to identify strategies that work in practice

Journal Title
Volume #, Issue #, 20##, https://<websitelink>.com

ISSN: ####-#### (Print), ISSN: ####-#### (Online)
https://doi.org/########################## (Article)

to acquire professional competencies in the international Chinese context. It is necessary to consider aspects such as organization, participants, materials, methodology, design process, and learning outcomes.

Organization

The workshop activity is usually defined as a relatively short-term, intensive problem-focused learning experience that actively involves participants in identifying and analyzing specific design questions and developing and evaluating solutions (Sork, 1984). The workshop organization promotes further encounters between theory and practice and professional practice and research, facilitating interdisciplinary collaboration. The construction of knowledge is made in scenarios that reproduce collective practices. Consequently, it is an appropriate method used at different academic levels to complete the students' learning process of acquiring competencies linked to the practice.

The impact of workshops and other developmental activities has been recorded in an extensive narrative (Drum and Lawler, 1988). Workshops are an excellent model for reflection in action to acquire tacit knowledge (Schön, 1985); therefore, several schools emphasize the value of thinking and making. Both thinking and making naturally work together, establishing the building process. The act of construction should be understood as a creative action that belongs to the design process; it becomes a learning tool and acts as a catalyst for making design decisions, breaking the gap between theory and practice. The workshop model should include experiential learning sensitivity to different learning styles and diverse training activities (Brooks and Stock, 1999).

To organize a successful construction design workshop is crucial to balance theory and practice that support each other continuously. The construction principles integrate into design projects as an application of new learning by unifying theory and practice.

The degree programs currently include digital and parametric design tools, focusing on the students' learning outcomes in computational and software capabilities at the expense of the materials and construction systems consideration linked to the design process. Touch, feel, and learn the material's properties act as input to trigger students' critical thoughts of materiality and use. As Richard Sennett argues, "making is thinking"(Sennett, 2009); he highlights the idea of knowledge in hand gained through touch and movement.

The experience with objects configures the basic cognitive concepts that will be applied later to the design process. Throughout the tacit experience, the knowledge acquired should include texture, measures, how the materials are stacked, assembled, transformed, construction techniques, forms making possibilities, symbolic qualities, and structural and aesthetic potential. The project conception and the act of making include theoretical and aesthetic concerns and the effective use of the material. Furthermore, it also accounts for the relationship between form and materiality and the consideration of environmental impact, durability, safety, reliability, and maintenance. The material's knowledge is transformed into a design tool; it gives the students valuable and practical knowledge beyond the theory, which will be essential to resolving practical design issues.

Consequently, it should be considered a fundamental element of the design process that informs and generates the details. As Marco Frascari argues (Frascari, 1984), the detail holds the genetic information for any design project, allowing the entire design to be revealed in the smallest pieces; the parts inform the whole. The process of doing connects the idea to its reality through the construction, experiencing details as design generators.

The workshop model should additionally include experiential learning, sensitivity to different learning styles, and the use of diverse learning activities (Brooks and Stock, 1999). Innovative methodologies can enable and promote new aesthetic experiences to improve training opportunities and meet diverse learners' needs, including increased knowledge and

personal awareness or self-improvement through experiential learning (Brooks and Stock, 1999). The students are immersed in the potential of construction on-site, where we experience the atmospheric phenomena, the light, and views, and it engages them in the design process.

Collaborative Effort. Architecture is always a Collective Act

Collaboration with other creative disciplines generates the incorporation of complementary notions, concepts, and methods. The formation of interdisciplinary and intercultural working groups is essential for students' awareness of their learning process singularities and working methodology. In a workshop that promotes the exchange of architectural thought and practices among disciplines, tutors and students from various fields are essential. In the same line of thought, Bassett Jones points out that diversity within a group can contribute to more effective decision-making and problem-solving capability by providing a diverse range of perspectives, comprehensive expertise scope, and more resilient critical evaluation (Basset-Jones, 2005). It is essential in a specific and particular Chinese context where the participants were active learners from different disciplines that need to develop their critical design approach.

To make successful working teams is necessary to include students with enough design knowledge and the maturity to work as an integrated team. Due to the multiply and complex working dynamics that concern a workshop environment, knowledge integration potentially increases. The interaction between students from different backgrounds and degrees, even at a different level of education, can be beneficial for all participants and ensure suitable and fruitful debates. Working teams characterized by diversity have the capability to establish broader relationships, cultural capital, and bicultural competence, increasing productivity, innovation, and creativity. Authors like Adler refers that diversity in multicultural teams is linked with positive group goals regarding creativity and problem-solving (Adler, 2002). Moreover, Hennessey and Amabile suggest that diversity, combined with understanding individual strengths and weaknesses into teamwork, enhances initiative and resourcefulness (Hennessey and Amabile, 1998).

The learning environment corresponds to interpersonal relationships and the physical place where they occur. The relationships are determined by a trusted environment generated within the workshop; it is a fundamental condition to stimulate creativity development. In the same line of thought, learning in architecture requires the generation of various learning environments that promote experiences in the exercise of creativity (Hertzberger, 2008).

The workshop projects were realized throughout on-site discussion; thus, collaboration is constant. Using the retrieved knowledge in decision making and developing design by integrating appropriately different solutions, the students experience the design as professionals. They cultivate their communication along with negotiation, and assertive skills, students further enhancing their problem-solving resources. The dynamic is organized to learn from each other, making inquiries to their peers. Due to their different design learning experience, students interchange knowledge between them; students from first-years bring design ingenuity, whereas higher grade students contribute with more advanced technical solutions.

The execution of projects in the short term involves a quick understanding and approach to the subject and the context, as well as a flexible methodology and cost-effectiveness. The intense five days of the workshop involve working throughout the day and thus also create a condition of community among participants. The communal act of construction creates a community artifact, integrating architectural, structural, and conceptual design, often reflecting in contemporary topics. It shows the potential for architecture education through the production of physical outcomes. Therefore, the workshop is suitable to become a regular part of education in the course framework, even when it usually takes place through non-teaching slot time in the academic year.

Students and Tutors

The student's participants are from second to fourth-year in the architecture and Industrial design program degrees. The groups were organized to involve students from both degrees and in different stages of their learning process. In the Chinese context, the first year is an introductory course; the students from year two can be considered in a comparative case as students from year one in the western programs. Chinese students are not usually trained to learn through experimentation and exploration; thus, the construction design workshop experience represents a challenge in pedagogical dynamics.

The learning between and among participants is encouraged due to their different backgrounds and different learning levels. Based on this premise, it is possible to manage diversity and complexity, applying inclusive pedagogy. The teaching team encourages learning, motivating, and coaching students to establish a shared knowledge performance in an open mindset structure (Brooks, 1999). The Workshops are organized to promote student autonomy — the dynamic of work aimed at self-organization through their participation. The assignment of clear roles emphasizes debate settings and peer discussion that involves learning by discovering both the group members' inherent abilities and the specific contents of the architectural topics addressed (Bruner, 2001). The teaching team is responsible for creating frameworks and dynamic social circumstances in which it occurs.

The guidance process focuses mainly on developing the process and its different stages and not specifically on the outcomes. The intention is to establish guidelines focused on the students' progress and their ability to respond to challenges and unexpected spatial modifications included in the design-making practice. The experience enables individual and group learning through the students' engagement. There will appear diverse creative responses conceived through the collective participation within the process. Consequently, the students recognize that they are involved in an ongoing team learning process, acknowledging its advantages.

Both tutors and students build the workshop experience compelling and determine it dynamically, following the structure of fundamental principles and objectives proposed. Work and knowledge are generated by the process of making.

Methodology

Each workshop adopted a similar applied design approach that starts from studying the material, generating opportunities for reflection into the design process. The workshop learning process can be regarded as a reflective practice in which the student engages in reflection in action. The design process occurs as a sequence that acknowledges the material properties and constraints and how it affects the design proposal. The design process into the workshop is understood as comprising the stages of analysis and evaluation of prototypes in one of them, and the reused materials in the other one adapting the design to the material constraints. It makes possible the creation of circumstances and conditions in which the design process can be investigated in the context, including the related research variables, the concerns, and the reflections on materiality and design. The practice design research provides tools and methods applicable to different design processes. The research on the material enables students to build knowledge by doing observation analysis, interpretation, and reasoning. Understanding the issues and problems belonging to the different prototypes, the students acquire complete knowledge from the material that forms the basis of the proposals, informing them. It leads students into the design process, guiding them in decision making, which improves their problem-solving competencies.

The experimentation allows the students to explore new concepts, models, and methodologies to check the feasibility of designs, testing the adequacy of material performance and projects before the final design.

Designing Furniture with Recycled Materials. Zuloark Office of Architecture

Topics: Designing with Recycled Materials

The workshops aim to provide students with additional skills or knowledge. In this case, the topic addressed was the CO2 footprint linked with reuse, recycle materials along with upcycling processes and concepts. It is essential to make the students aware of these contemporary topics concerning sustainable global attitude, reduce material and energy use, to promote sustainable production. China has one of the highest C02 footprints together with high levels of pollution and incipient recycling regulations policies, which makes it essential to include this awareness into the students' design process. It is necessary to consider the materials' knowledge and their possibilities in the culture of use and throw regarding upcycling processes to be included later in their professional activity.

Upcycling is the act of reusing discarded materials, transforming them into new products with higher economic and environmental value. With the design implementation strategies, the upcycling concept could be applied in the education context, establishing new ways to think about the lifecycle of materials, products, and buildings. As educators in the design context, we should reflect on the way we make things and how the upcycling process as part of a circular economy could reconnect people, materials, and places, consider the value, and envision future value (industrialization and mass production results in a disconnection between people, places, materials, and design).

The upcycling main idea is to revitalize the material into something with the same or higher quality, adding a feature, keeping its essence, and giving them a second life (Braungart and McDonough, 2002). The benefits of upcycling have been discussed in terms of sustainability, economic, environmental, and social sustainability. Environmental benefits include the reduction of solid waste, raw materials, energy, and gas emission. The economic benefits can include cost savings and new profit opportunities for manufacturers, entrepreneurs, and consumers. Furthermore, Social benefits include psychological and socio-cultural benefits based on individual upcycling.

The re-utilization understood as the action of using a material several times, whether for its original purpose (conventional reuse) or different, applying a creative approach to change its use. It can make materials available to people and organizations with limited resources, creating jobs and new profitable business activities that contribute to the economy. In craft and design education, upcycling is also an easy and economical way of getting materials for student projects.

Professors should incorporate a complete and integrated resource management overview with the aesthetic and technical considerations in construction performance. In addition to the life cycle of the materials, it is necessary to consider their durability, quality, and the environmental, cultural, and social impact that would be generated (Mileto et al., 2014).

The architectural design contribution to the circular economy changes the design process. The material as a base element for the construction represents a key aspect in the definition of architectural language and should work as a pedagogical strategy tool that informs the design proposal. It allows designers and students to understand how architecture can be produced out of leftovers, giving the material a new life.

The reused materials were donated by the University management department and collected from a construction site. The selection was based on its disponibility on site and attending to its technical properties, performance against the environmental conditions to which they would be exposed, and its life cycle. The materials collected included: wood table, wood formworks, corrugated steel bars (sometimes rusty bars), perforated steel sheets, prefabricated concrete vault, bricks, and bamboo.

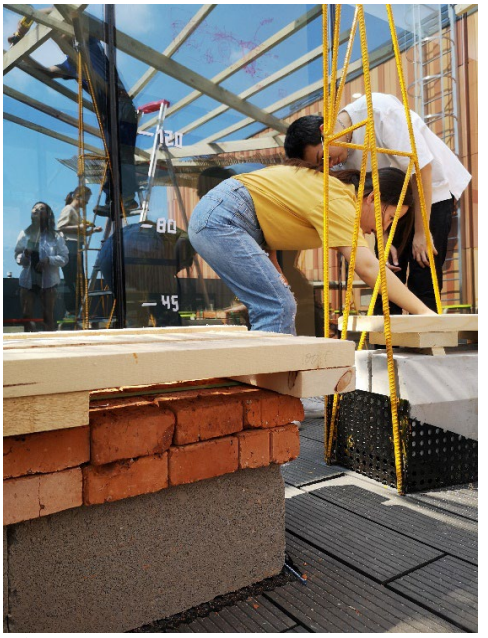

Figure 1,2. Construction process.
*Source: Sofia Quiroga 2018**

The workshops allowed students to experience an entire project's rapid completion in five days, from the design to the construction.

Day 1. Site visit/exploration of the materials/ design concepts.
Day 2. Commun Design / constrains (material, site, team work) / design adjustments.
Day 3. Teams collaborative proposal/ roof structure/ construction starts.
Day 4. Construction process.
Day 5. Construction process.

The proposed goal is to design and build a leisure space throughout the furniture to provide shade, using assembled second life materials and leftovers (Figure 1) from site constructions (Figure2). The exercise of design and make work both as test furniture design object to reduce the CO2 footprint and as a scholar community project.

The workshop proposal was located in the Design Building at XJTLU. The methodological approach was to divide the terrace into seven areas, one per working group. The area assigned was equal for all the groups, as well as the selected materials. The fixed number of materials and the number of elements were a requirement condition that constraint the design process. The combination of materials, its assemblage, and the canopy structure were compositions and challenging problem-solving exercises, which help the students understand the materials' peculiarity.

Figure 3. Construction process.
*Source: Sofia Quiroga 2018**

Each group is designing a bench that needs to consider the other groups' projects to combine all the designs and work as a unit. Each bench project has one support for the canopy. The heavy materials were used as the foundation for the light steel bars structure, which was geometrically designed to support the canopy's weight (Figure 3). The supports were distributed to equalize the distances between the main bench points as much as possible to find the spatial balance and ensure proper structural performance. The position of the benches on the terrace is also performing the spatial shelter configuration. On the top, three layers of wood beams

connect the elements at different heights. The connection was explored playfully to create the roof's support for the weaving bamboo acting as a sun shelter.

Figure 4. Construction process.
*Source: Sofia Quiroga 2018**

The firsts design decisions were to find the individual benches' position (one per group) that holds a single and unifying canopy; it was one of the most critical decisions to achieve the group outcome. The teams discussed the design proposal to develop a mutual design understanding, combining several ideas or developing one. At this specific moment, the group's atmosphere, the way they discuss and get some agreements are the key to achieving the collaborative design proposal (Figure 4). The methodology allows the students to conduct the process reducing the tutor involvement to the minimum. The group members require to rely on their ability to reflect, make decisions, and organize the design task. They should adopt different team roles to exchange complementary knowledge and complete the proposed outcomes successfully on time.

The design process is built up in a circularity mechanism between drawing and making, avoiding the disconnection between simulation and reality, and at the same time, it connects hand and mind, design process, and making. All the design operations on-site were performed manually, assembling all the materials, verifying construction details, and finding strategies to build.

Some of the joints between materials were made following traditional wood articulations, and others were digitally designed using for this purpose 3D printer machines. The combination of hand tools and digital fabrication makes possible the precise resolution of the small details. All the decision-making was based on communication strategies to achieve the best possible project outcome as individual groups and as a complete team (Figure 5).

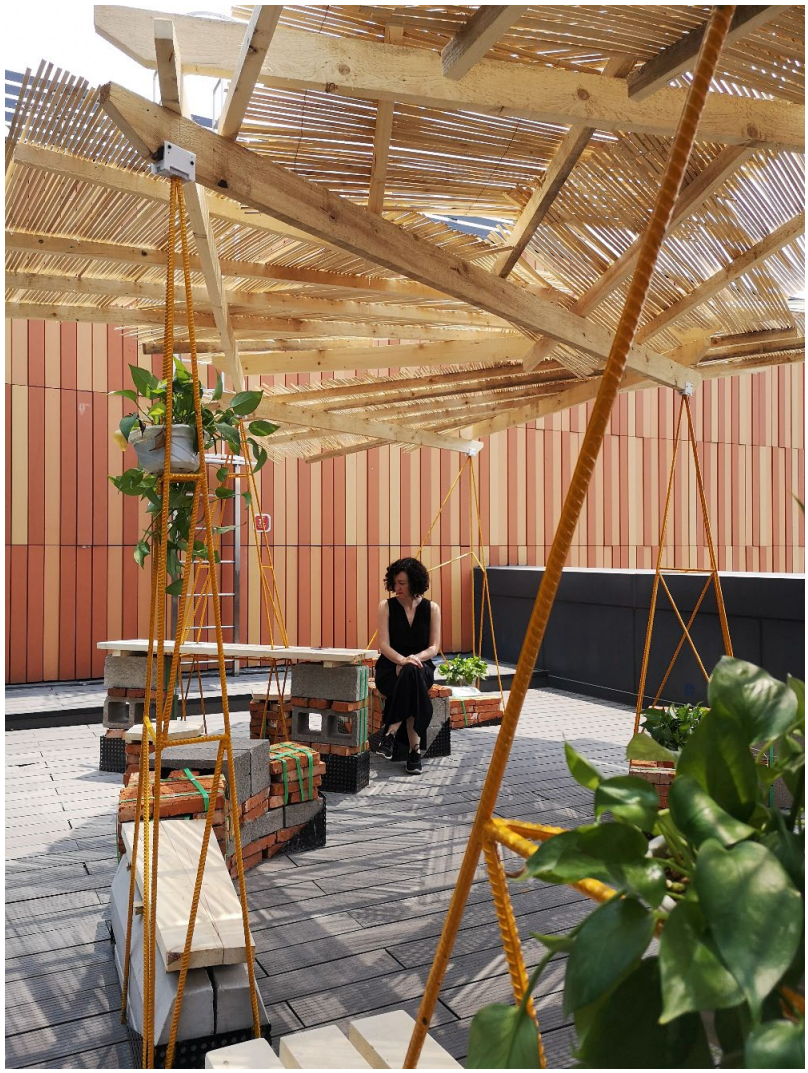

Figure5. Final Outcome, Terrace Furniture.
*Source: Guillermo Sánchez 2018**

Activating the Ceilings: Learning from Tradition; Bamboo and Rattan Workshop

Topics: Craftsman Knowledge. Learning from Tradition with the Taiwanese Industrial Designer and Artist Cheng Tsung Feng

Bamboo is an environmentally-friendly material historically used in China for construction and design tools due to its vast bamboo resources. The traditional bamboo handcraft knowledge is an endangered intangible cultural heritage; the ancient techniques embody history and culture, carrying significant social and cultural values. It is necessary to preserve this craftsman's wisdom, researching its techniques already misused to record construction processes and steps. It would maintain the methodology and techniques that are disappearing. Its study promotes cultural conservation and traditional wisdom embracing vernacular techniques as a model.

The Taiwanese designer Cheng Tsung Feng's work, is based on studying the wisdom enclosed in these traditional tools and methods characterized by material integrity and its construction processes.

Understand the link between modernity and tradition is fundamental for students. They can learn how to reinterpret and transmit prior knowledge to contemporary designs, finding modernity within the tradition. The study of traditional techniques and methods is translated into a contemporary language through creativity, studying intensely material properties and their infinite possibilities to constitute technical details (Figure 6).

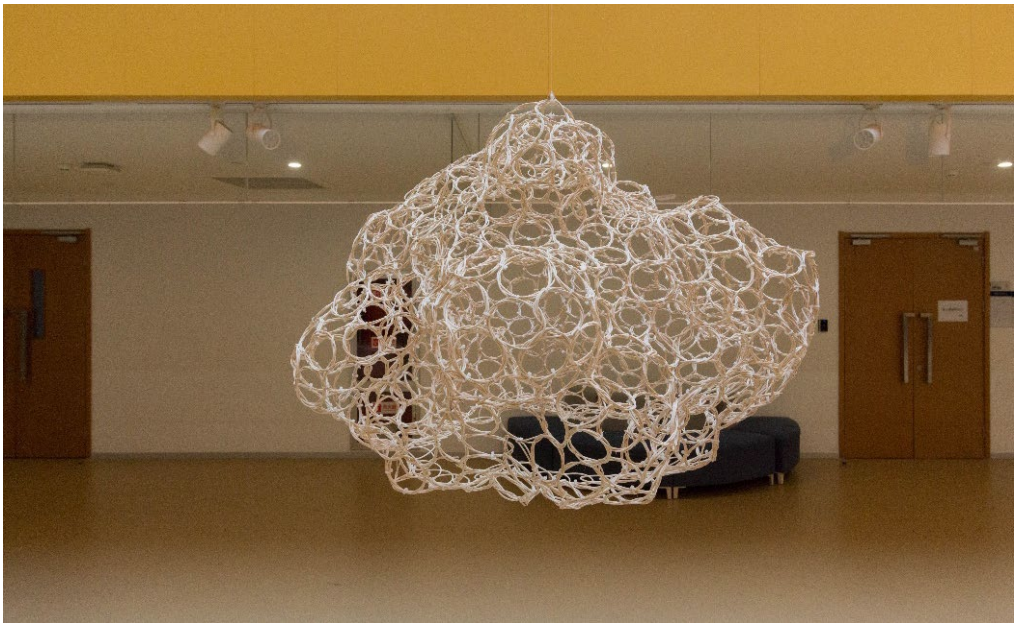

Figure 6. Ratan Prototype.
*Source: Sofía Quiroga 2018**

As Murcutt points out, knowledge can be transferred to design by understanding the material's principles (Curtis, 1996). Addressing this thought, the students start discovering the materials' properties through a try and error process by exploration and modeling. The knowledge acquired is based on research exploration and the manipulation of the material. The study of crafts, together with the tutors' design guidance, responds to sustainable cultural challenges. Throughout the exploration phase, the students discover the aesthetic value, the cultural meaning, the structural properties, and the different design and building applications regarding line, volume, or surface linked to the design process. Subsequently, the design process related to the experience may augment the creative process and keep the learning outcomes as valuable and applicable knowledge based on delicacy on production and attention to details linked to the materiality (Figure 7).

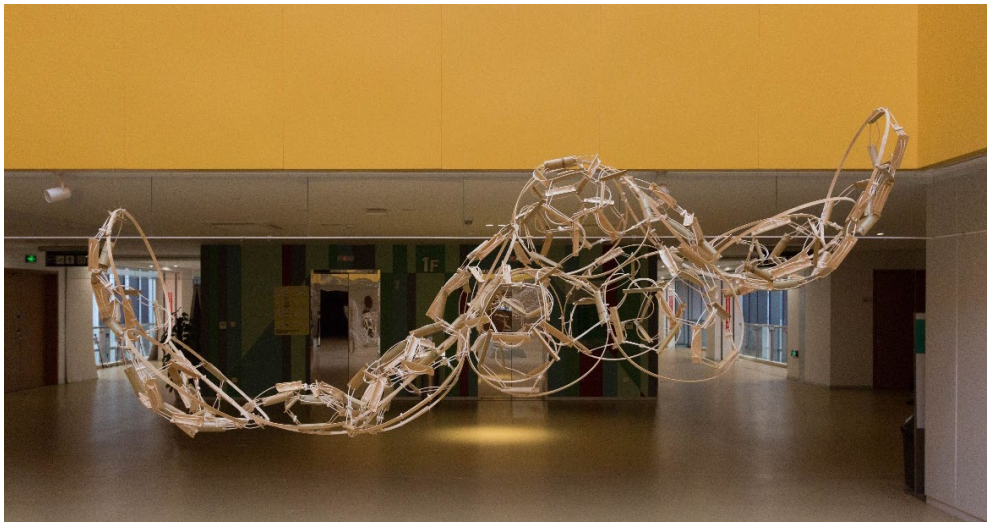

Figure 7. Bamboo and ratan prototype.
*Source: Sofia Quiroga 2018**

The workshop sequence is structured with an increasing complexity level along the week and at a different design and construction scale.

Day 1. Material knowledge/ design concepts / development of 10 prototypes.
Day 2. Critical reflection/ findings presentation/ development of 3 prototypes.
Day 3. Critical reflection / combination of units to develop a structure/space.
Day 4. Final design / construction process.
Day 5. Construction process / exhibition / presentation.

The workshop was developed starting from the exploration of the material properties together with its aesthetic value. The groups began proposing ten different successive small models that conform ten different approaches to the material properties in the sense of resistance and form along with its aesthetic value. This first approach lets the students achieve by modeling the first outcome and the material's knowledge throughout experimentation. The students explore the material properties and their aesthetics combinations, making small models that merge the different materials. Each team chooses ten of these explorations models based on the relevant knowledge acquired during the process to present their findings to their peers(Figure 8). From these ten models (day 1), they chose the main ideas based on the material performance to develop further the finding concepts in three new models, keeping in mind the idea of combination and repetition to build a spatial structure (day 2). Each group worked on these three units, making observations, deductions, and variations to select one of them to further exploration.

(Day 3) The students explore the different combinations of the unit selected to develop strategies between elements to get a spatial structure. The challenge addressed was exploring and studying the connexion of edges, points, surfaces, and spaces created, questioning and adjusting the unit's rotation, variation, scale, joints by modifying the design throughout the process. (Day4) After studying the units, the group participants, based on pragmatism and collaboration, started the final design. The students finish the spatial design based on the material resources left, hand-production, scale, and manufacturing processes. It became a learning exercise in material and cost-efficiency, similar to a commitment in practice. (Day 5)

The attendees successively finalize their design projects to be part of an exhibition where the groups displayed the process and the final design outcomes.

The achieved outcomes through the combinations of the first selected units demonstrated the capacity to think, reflect, and design by doing, obtaining a manual parametric design without any usual parametric tool. By using the learning parameters, the students modify and adapt the design. The process starts researching the material and testing small units to achieve by combining them the best possible spatial proposal (Figure 9).

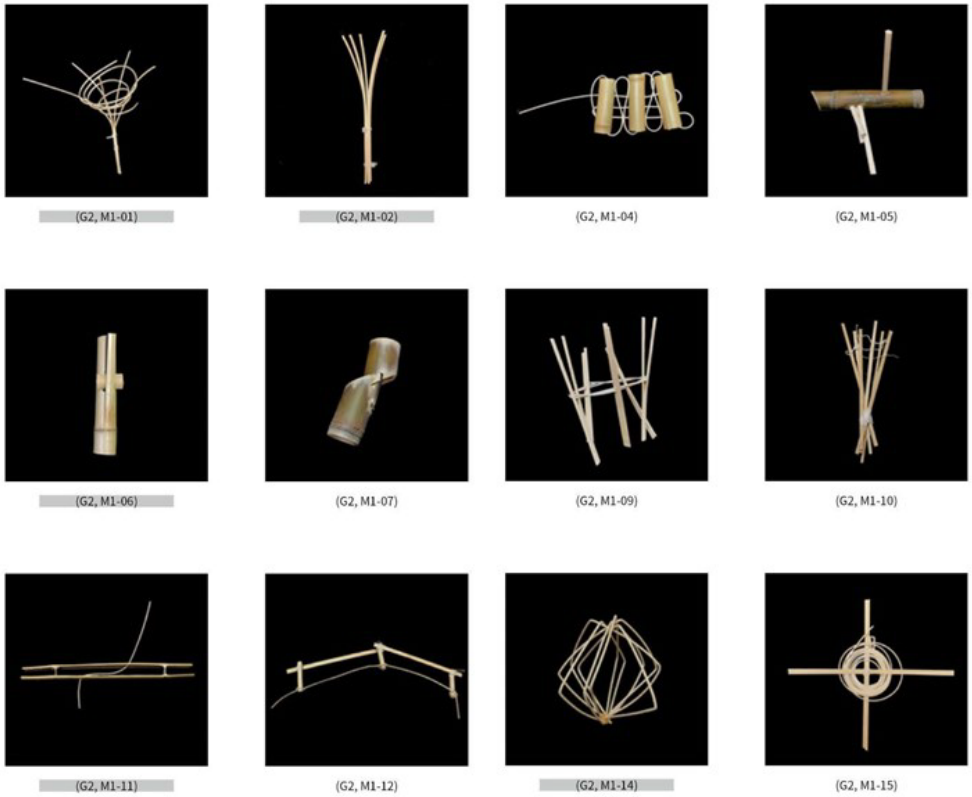

Figure 8: Explorations.
*Source: Wei Chun Lin 2018**

Summary and Conclusion

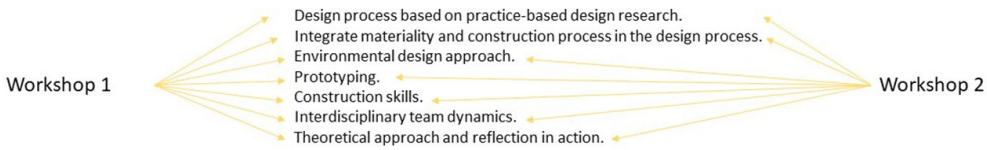

Figure 9: Outcomes matrix
*Source: of the article 2019**

The dissertation illustrates that active learning increases student design capacities. The design related to the practice and the experimentation may increase the creative process and

keep valuable learning outcomes; The knowledge acquired by the experience of doing could be included as an integral part of the design curriculum. The construction workshop activities also confirm its capacity to introduce teamwork to the educational program. Even though the Chinese educational system is gradually adapted to a global education context, teamwork is crucial in the Chinese context, in which educational principles are based on competitiveness. The Chinese education system is one of the most rigid and competitive globally and emphasizes standardized testing across all subjects (Zhao and Gao, 2014).

Experiential and active education needs to provide design strategies and methodologies for empowering social knowledge exchange between participants; the project-based approach strengths collaboration and experimentation between participants. It increases students' motivation and encourages participants to apply the knowledge acquired in the traditional lecture set-up. Active engagement in practice within the context of a student's degree drives the student's capabilities to produce knowledge through reflection and learning actively. Additionally, the construction materials constitute a transversal subject that must be approached both from a design and compositional perspective and from a constructive and structural perspective. The workshop represents an opportunity to address these concerns; it could be added to know and study the material's properties effectively (Figure 10).

Based on the material exploration and knowledge, the pedagogic approach holds the potential for framing the creation of a new dynamic design process based on practice design research, analysis, and evaluation of the material's design possibilities through its exploration and prototypes. It enables Chinese students to develop new frameworks for participation and exchange.

Regarding the methodology, it can be concluded that the adequate selection and organization of the theoretical contents, together with complementary activities by doing, facilitate the students' learning process by identifying and understanding the construction materials, their techniques, structural performance, and detail design. Combining their study program with practical teaching strategies would establish knowledge more directly and more enjoyable than an isolated theoretical approach. The workshop design methods can be integrated with curricular activities and support the learning experience from process to execution, engaging students in design activities and knowledge production. The construction design workshops should be an essential part of the program to understand how the design studio activities can be complemented by including practical and experimental research processes that will inform the design processes. Through this experience, the students should gain the ability to recognize the constraints and correct use of the materials, the ability to search and filter information from context, transforming it to give feasibility to their ideas, the ability to argue and to defend their design choices, and the use of prototyping as a simple demonstration tool. Both workshops provided opportunities for interaction, feedback, and choices linked to design and fabrication processes.

Despite being designed in and for different spaces, the students' proposals for both workshops provided opportunities for interaction, feedback, and choices linked to design and fabrication processes. The applied pedagogic approach outlined in this paper was successful regarding the knowledge acquired from the experience, the completion and construction of spatial devices, and the development of collaborative projects.

These workshops show the combination of the theoretical approach and the reflection in action through the transformation of materials directly related to the spatial proposals(to be used/exhibited). The aim is to understand the architectural implications of basic structural and construction systems to integrate appropriately as design strategies. The workshop linked to materiality as a knowledge generator and a design research medium should be used as an effective architectural pedagogy tool to complete students' design competencies.

The impact of experiential workshops on the Chinese academic environment can implement the student's creative and critical thinking as well as their design management tools.

The act of making generates ideas, insights, and new knowledge that the student can use as part of their design research approach. The inclusion of environmental topics and creative action by exploring the material makes the students aware of different environmental design approaches that can work to implement their future approach in practice.

Figure 9. Exhibition.
*Source: Sofia Quiroga 2018**

Acknowledgment

Thanks to our guests, the Zuloark office, and Cheng Tsung Feng for their fantastic work. Both of them made these workshops possible. Special thanks to XJTLU Architecture and Design department for its support in organizing these workshops. Lastly and foremost, most profound thanks to the students who participated for their enthusiasm and fantastic engagement.

REFERENCES

Adler, Nancy. J. 2002. *International dimensions of organizational behavior*. Cincinnati: OH: Southwestern.

Baum, David. 2011. *Course design for increased student satisfaction*. Leeds: Leeds Met Press

Bassett-Jones, Nigel. 2005. "The Paradox of Diversity Management, Creativity and Innovation." *Creativity, and Innovation* 14 (2): 169-175 https://doi.org/10.1111/j.1467-8691.00337.x

Braungart, Michael, and William McDonough. 2002. *Cradle to Cradle: Remarking the Way We Make Things*. New York: North Point Press.

Bruner, Jerome. S. 2001. *El proceso mental en el aprendizaje*. [The mental process in Learning]. Madrid: Narcea.

Carpenter, William. J. 1997. *Learning by Building: Design and construction in architectural education*. New York: John Wiley & Sons.

Mileto, Camilla., Fernando Vegas, Lidia García Soriano, and Valentina Cristini, V. 2014. *Vernacular Architecture: Towards a Sustainable Future*. Londres: CRC, Taylor & Francis Group, Balkema Publisher.

Frascari, Marco. 1984. "The Tell the Tale Detail." In *Via 7, The building of Architecture,* edited by Behrens, Paula, and Fisher, Anthony, 23-37. Cambridge: the MIT Press.

Hennessey, Beth. A., and Teresa M. Amabile. 1998. "Reality, intrinsic motivation, and creativity." *American Psychologist*, 53 (6): 674-675. https:// doi:10.1037/0003-066X.53.6.674.

Hertzberger, Herman. 2008. *Space and learning: Lessons in architecture 3*. Rotterdam: 010 Publishers.

Brooks-Harris, Jeff E. and Susan R. Stock-Ward. 1999. *Workshops: Designing and Facilitating Experiential Learning.* London: SAGE Publications.

Braungart, Michael, and William McDonough. 2002. *Cradle to Cradle: Remarking the Way We Make Things.* New York: North Point Press.

Curtis, William J. R., 1996. *Modern Architecture Since 1900*. London: Phaidon, 640.

Schön, Donald A., 1985. *The design studio: An exploration of its traditions and potentials*. London: RIBA Publications.

Sennett, Richard. 2009. *The Craftsman*. London: Penguin Books.

Sork, Thomas J., 1984. *Designing and Implementing Effective Workshops*. San Francisco: Jossey-Bass.

Turgut, Hülya, and Cantürk, Emel. 2015. "Design workshops as a tool for informal architectural education." *Open House International* 40 (2): 88-95. https://doi.org/10.1108/OHI-02-2015-B0012.

Zhao, Xu. and Minghui Gao. 2014. "No time for friendship: Shanghai mothers' views of adult and adolescent friendships." *Journal of Adolescent Research.* 29 (5): 587–615. https://doi:10.1177/0743558413520225.

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[1] Zuloark Office: Zuloark is a Spanish architecture office formed by a multidisciplinary team that advocates creating knowledge networks through divergent experiences. Their work acknowledges environmental and economic constraints as well as the necessity of evolving entrepreneur models.

Zuloark has worked independently and collaborated with internationally renowned architects, being awarded in different international architecture/design competitions. One of its principal interests is focused on teaching, developing a methodology based on "learning by doing. The office has been regularly invited as visiting professors to national and international universities, including USJ Zaragoza University, Javeriana University of Bogotá, and the Berlin University of the Arts (UdK).

Zuloark also works in organizations and builds project management, developing research and participative design strategies in the urban environment. Its collective has also been involved in designing and making furniture included in urban installations like "Gran Via, Gran Obra", awarded in the XI Spanish Architecture and Urbanism Biennial. Since 2007, together with other collectives, Zuloark created IC - Inteligencias Colectivas project (Collective Intelligence) - awarded with the first prize at "Arquia Próxima" 2012 competition held by Fundación Caja de Arquitectos, also awarded in the VIII Iberoamerican Architecture and Urbanism Biennial, and it was a finalist in the XII Biennial of Spanish Architecture. Zuloark participated in 2014 in the "Uneven Growth" exhibition at MoMa, New York. http://zuloark.com.

[2] Cheng Tsung Feng: Cheng-Tsung Feng is a young Taiwanese artist who describes himself as having an old soul in his body. Cheng-Tsung Feng is fascinated by exploring the wisdom condensed out of time hidden in traditional utensils. As an artist, he is reluctant to let go of these intangible assets along with traditional utensils. Thus, he inherits them by design and learns to create utensils from their tradition. Feng is known for his reinterpretations of techniques established in times gone by, specifically those embodied in bamboo craft or other hand-made skills with origins in Taiwan.