Design 2030: Education

What are the educational models upon which young designers today are trained? What has remained of the training models of the past? Are there models that present elements of innovation and experimentation, and that question the modes and approaches of education established to date?
Does it still make sense to speak of training as belonging to Design, or is Design becoming a basic discipline in and for other training projects addressing society as it develops?
Making reference to the international scenario, issue 71 of **diid** intends to explore and give voice to those training experiences that, at design schools, are imagining a new approach to training – one more in keeping with a possible future that looks to be uncertain and still undefined, due to the incessant, rapid, and ubiquitous digital revolution that is proposing and experimenting with new models and styles of learning and knowledge.

Giuseppe Losco

Yavuz Alastair Fuad-Luke, Mariagela Francesca Balsamo,
Ambra Borin, Daniela Busciantella Ricci,
Luisa Collina, Mirko Daneluzzo, Luigi Ferrara,
Silvia D. Ferraris, Giuseppe Furlanis,
Albert Fuster I Martì, Laura Galluzzo,
Luca Galofaro, Luca Guerrini,
Matteo Ingaramo, Salvator-John A. Liotta,
Giuseppe Losco, Yongqi Lou,
Francesca Mattioli, Davide Paciotti,
Giulia Panadisi, Tonino Paris,
Isabella Patti, Lucia Rampino,
Chiara L. Remondino, Massimo Santanicchia,
Sofia Scataglini, Manuel Scortichini,
Jennifer Schubert, Andreas Sicklinger,
Paolo Tamborrini, Seçil Uğur

Design 2030:
Education

Index

Diverse together: learn by collaborating

Historically, academic design education is delivered largely through active and collaborative learning modes, where students - working in small groups - learn to design by designing. Remaining implicit for a long time, the educational practices adopted by teachers today worth to be made explicit, to become an area of study and disciplinary discussion. In the contemporary scenario, active and collaborative learning are confronted with the phenomenon of the increasing cultural plurality of classes, due both to internationalisation processes and to the enhancement of interdisciplinary paths. The practices proposed within Design studios must therefore address the presence of cultural plurality, as an element that enriches the teaching experience but, at the same time, determines greater barriers for collaboration and therefore for learning.

This essay presents three cases of action research in the field of Design higher education in culturally plural contexts. In each case, explicit procedures for the formation of teams of students were defined and, in two cases out of three, a support activity for the teams was provided. The three different approaches were defined according to the peculiar characteristics of the classes and courses. The analysed experiences show that, to maximize the effectiveness of active and collaborative learning, it is important for teachers to explicitly refer to the skills that students should acquire through collaboration in plural contexts so as to encourage the development of students' awareness. Teachers can therefore effectively contribute to the growth of their students in terms of transversal skills – both collaborative skills and cultural sensitivity - by taking a proactive role with respect to the formation of teams.

Francesca Mattioli, Silvia Ferraris, Lucia Rampino

PhD Candidate, Politecnico di Milano
Associate Professor, Politecnico di Milano
Full Professor, Politecnico di Milano

> **francesca.mattioli@polimi.it lucia.rampino@polimi.it
silvia.ferraris@polimi.it**

Since several years, the evolution of teaching strategies is moving towards active learning models, promoting the integration of active learning to enrich the traditional structure of *ex cathedra* or "receptive" courses. The core idea underpinning this innovation process is that learning is richer and more effective when teaching activities involve students in doing and then reflecting about their learning (Bonwell & Eison, 1991). Therefore, it is not enough to rely on the typical assumption of receptive teaching that students absorb knowledge simply through listening to a lesson, watching a video or reading a text (Bonaiuti, 2014).

In this regard, Design education, being descended from Architecture and Art and Craft education, turns out to be in the vanguard since it has always largely employed a teaching approach that include active learning of design through practice. In fact, in the context of studio courses, students have always been exposed to learning-by-doing (Tracey & Boling, 2014).

The courses typically called "design studios" or "workshops" are configured as gyms where students experience the design practice, learning to act and think like professionals. This kind of teaching falls within the definition of problem-based learning, which is based on the idea that learning passes through the resolution of a problem initially posed by teachers (Sancassani, Brambilla, Casiraghi, & Marenghi, 2019; Savin-Baden & Major, 2004). When - as in the case of Design - teachers pose problems related to design, we speak more specifically of project-based learning (Savin-Baden & Major, 2004) or design-based learning (Gómez Puente, 2014). Both the teacher-student relationship and, often, the learner-learner relationship are interactive; from one side the teacher follows the development of the project by advising on the different design aspects and, on the other hand, students often work in teams.

It can be said that the design training also integrates forms of collaborative or cooperative learning (Matthews, Cooper, Davidson, & Hawkes, 1995; Panitz, 1999) when design challenges are posed to and faced by groups of students who collectively contribute to the realisation of the project; this approach supports the development of purely disciplinary skills (hard) as well as collaborative and transversal skills (soft).

Collaborative practices and cultural plurality

In the outlined scenario, recent policies in higher education value internationalisation and interdisciplinary paths defining a new horizon for collaborative learning, especially master's degree courses. Here, collaborative learning occurs more and more frequently in courses characterised by a remarkable cultural plurality. The students embedded in these environments have the opportunity to interact and collaborate with groups of individuals plural by age, ethnicity, religion, language, gender, nationality, study background, experiences. Such contact, if carefully guided, can stimulate their cultural sensibility which is a relevant ability both to train contemporary designers (Christensen, Ball, & Halskov, 2017; Gautam, 2012; Lee, Ha, & Fairfax, 2016; Murdoch-Kitt & Emans, 2020) and global citizens. This last achievement can be intended as the broader objective of the internationalization processes themselves.

Albeit the presence of culturally plural individuals creates a potentially favourable condition, evidence shows that plurality is not a sufficient condition to ensure integration processes, inclusion and awareness. Some authors have argued that policies of internationalisation, to be effective, must necessarily be followed up in teaching practices (Spiro, 2014). In this regard, to carefully supervise the composition of working teams in classes that integrate collaborative learning modes, turns out to be essential (Trahar & Hyland, 2011). Teams composition is a crucial factor to ensure that all the students in the class will live a learning experience that include the interaction with culturally plural peers.

This evidence shed a light on the need for teachers to consider and carefully manage the collaborative practices. Coherently, in the field of Design it is important to formalise this knowledge to identify and promote the effective approaches already present in existing teaching practices (Poggenpohl, 2004; Poggenpohl & Satō, 2009; Wilson & Zamberlan, 2015).

Our research interest is oriented to the study of collaborative learning practices in culturally plural design classes, to share and promote the discussion on these topics within the disciplinary context and beyond its borders. Collaborative learning practices, historically rooted in design education and constantly evolving in an increasingly interconnected world, can aspire to contribute to the wider debate about educational innovation and provide concrete strategies to educate global citizens.

As part of this research, this essay aims to discuss methods to manage the formation of working teams, topic often underestimated but highly relevant. Starting from the observation of Trahar and Hyland (2011), the way in which groups of students are formed is the first fundamental step to promote effective integration processes in the microcosm of the classroom.

By adopting an action research approach, the qualitative data collected during the past academic year in three case studies of different ways to form the teams are here proposed and analysed. The specificity of each case is determined by the characteristics of the class which, in our vision, affect the teacher's choices while planning didactic activities - formation of teams included-. These characteristics include the number of students, the type of course and its general structure, the proposed activities, their duration and influence on the evaluation of the course and so on.

First case: suggest and support
The first case refers to the "Product Development Design Studio", part of the first semester of the master's degree in Design & Engineering at the Politecnico di Milano. The teaching is therefore addressed to a newly established class, composed by 38 students coming from different bachelor's courses (mainly in product design and mechanical engineering), from international and Italian Universities (Ferraris & Mattioli, 2020). The course, entirely structured with a collaborative design-based learning approach, was divided into two independent design activities, temporally

sequential and with an increasing complexity. The final evaluation was obtained by making the weighted average of the evaluations of each activity.

In the beginning of the first activity, it was strongly advised by the teachers to compose teams of three or four students that were as heterogeneous as possible - i.e. interdisciplinary and international - but leaving the students free to group up. At the end of this activity, students had the opportunity to change the composition of the teams following the same indications. At the same time, in the beginning of the second activity, teachers started a parallel path, conceived as a seminar, to inform students about the importance of collaborative learning and teamwork to promote the development of soft skills. Subsequently, optional reviews about teamwork for groups were organised and facilitated by a tutor outside the teaching staff. During this activity, the members of the teams evaluated the experience of collaboration, identifying strengths and room for improvement, through discussions in the form of focus groups. Nine out of a total of ten teams participated to this activity, making thus possible to collect qualitative data about the students' experiences.

From the data collected, it emerges that the indications given for the constitution of the groups were respected by eight of the nine interviewed groups. The members of team 4, the only exception being formed exclusively by students from engineering bachelors, encountered some difficulties in dealing with the proposed design activities, having knowledge-gaps on the aspects of aesthetic research and visualisation of the project. «I was proud of our work, but when I started to compare it with that of the other groups I realised that it would take a designer in our group; seeing the projects all together on the same table our project does not seem to be done by a designer» commented a student of the group. These words well represent the extent to which the formation of the team influences peer-learning paths of individual students within the class and highlight the frustration that can arise from the lack of skills required to solve the design issues effectively. The presence of various skills could enable effective peer learning processes.

Only three teams decided to split at the end of the first activity and reformed with a different set-up for the second activity. These teams were slowed down compared to others in the start of the collaboration for the second activity, having to deal again with a phase of alignment. In fact, in most cases the students reported that at the beginning of the teamwork there was a need to dedicate time to mutual knowledge and understanding by aligning with each other on the collaboration rules.

All teams reported an initial communication difficulty caused by language - having to communicate in English - and cultural barriers (Ferraris & Mattioli, 2020). Most groups managed to overcome these barriers but in some cases they didn't. Different approaches to collaboration and conflict management, intensified by communication difficulties, led Team 9 to a deep internal crisis that strongly influenced the effectiveness of their collaboration. Also, during the focus group, the students came to the verbal confrontation, showing the devastating effects of these unresolved issues on the project development and, consequently, on the learning path of each one.

Second case: explain and guide
Parallel to the first case, another newly established class was about to start its first design studio in the Master of Specialisation in Industrial Design for Architecture at POLI.design. This class consisted of 12 students, architects, and interior designers, all coming from international universities and with very different experiences, being both recent graduates and professionals with a long-term working experience. In agreement with the teachers, a seminar was organized to train the teams as part of the first design studio, called Workshop 1, which includes a single collaborative design activity. First, students were introduced to the concepts of hard and soft skills, being informed on how collaborative design activities would allow them to develop both. Then teachers stressed on the importance of forming balanced groups, where individuals had complementary skills. Subsequently, students participated in an activity of individual reflection and representation of one's own skills, used shortly after as a tool to present oneself to the rest of the class and to the teachers. Listening to the presentations of the classmates, each student indicated the names of those they considered complementary to themselves in terms of experiences, skills and attitude. Finally, the teachers formed teams of three students for Workshop 1, considering the indications given by the students and structuring them so that they were as heterogeneous as possible.

At the end of the course, another final activity of evaluation of the teamwork was proposed, concluded with a moment of qualitative narration of the experience in the form of a focus group. It emerged that the preparatory activity made the students aware that the formation of the groups, although managed by the teachers, was based on their initial skills. To have a space to introduce themselves allowed everyone, even the less talkative, to tell about their strengths and weaknesses. The final focus groups showed also that in this case all the teams went through an initial alignment phase, useful to get to know each other and to establish how to collaborate. Similarly to the first case described in some working groups the plurality of disciplinary backgrounds and approaches to collaboration led to conflicts. In one team these difficulties led to serious relational problems generating great frustration in the group. This became clear during the final focus group in which all members of the group reported that they had experienced an extremely negative learning experience. As far as the other teams are concerned, many of them explained that they had perceived and acknowledged the plurality of while interacting with teammates.

Third case: mix and vary
The third and last case is related to the teaching experience in the theoretical course, Design Thinking and Processes, always part of the educational offer of the first year of the master's degree course in Design & Engineering at the Politecnico di Milano. In this case we refer to the teaching experience offered to the 89 students attending a newly established class with similar characteristics to those presented in the first case. This theoretical course has been redesigned providing active learning activities of various kinds: flipped classroom, seminars and collaborative activities (Mattioli

& Rampino, 2020). In the conception of the course, the activities have been designed to create moments of discussion, analysis of case studies and redesign of products by integrating the theoretical knowledge acquired. Since the course included four collaborative activities disconnected from each other and since teachers had to manage a large number of students, they decided to form new random working teams for each activity in the classroom. It should be noted that these activities did not directly affect the final evaluation of the students. At the end of the course, a moment of general evaluation was organised and students where provided with an individual questionnaire through which qualitative feedbacks were collected.

It emerged that the randomised formation of the working groups was perceived as largely positive because the variation of the groups made it possible to get to know the peers, making new friends and creating the opportunity to discuss and collaborate with many different people. «Team activities were my favourite, as we studied the details of the product that allowed us to learn new things and improve social interaction with other people»; «group activities were fun because in group you have the opportunity to know different perspectives»; «I met new friends and improved my language skills (in English)». The students' comments reported here show how this way of forming teams, in this specific context, contributed not only to learning but also to the socialising of first year students. This allowed everyone to get in touch with the plurality of individuals in the class, getting to know each other and creating new bonding.

Recommendations for future teaching practices
The collected empirical evidence shows that short activities with a less weight on the final evaluation allow students to get to know each other, to socialise, and to live teamwork more serenely, by autonomously recognising the positive value of collaboration as learning opportunity. Considering this, the teachers can evaluate the possibility of providing a series of initial activities, shorter and with an appropriate evaluation weight. During these activities students can become familiar with each other before being called to form teams to deal with a complex design problem. Specific paths to make explicit the importance of collaboration in groups made up of peers can support the development of a greater students' awareness, which is necessary especially in culturally plural contexts to promote effective collaborative learning processes.

As the first and second cases demonstrated, starting this type of paths does not prevent from relational problems in the groups, but it rather allows to develop awareness of the importance of collaborative aspects on students' learning. Additionally, monitoring activities by teachers after the formation of the teams allows to support students in understanding the experiences lived, whether positive or negative, making it a learning opportunity. It also allows the teachers to take an active role in guiding students to understand cultural plurality as a value, supporting from below the training of professionals who will be able to fit sensitively into complex local and global environments.

In today's academic context, where teaching and learning has a distinctly international character, the formation of working teams to carry out project-based teaching activities deserves renewed attention from teachers. Plurality can foster the development of cultural sensitivity which is a relevant element for the training of contemporary designers, but it also increases the barriers for mutual understanding within the groups. A greater awareness of learners on the importance of collaborative skills in culturally heterogeneous work teams allows to create a space where the teacher can manage more actively the formation phase of the groups. In this case the students will not experience this management as an imposition, but rather as a way to promote richer, fairer and more inclusive learning paths.

Looking at the evolution of didactics, we strongly believe that innovation can pass through a rethinking of consolidated practices, such as teamwork, especially when they are adopted uncritically. If reconsidered, these practices would benefit from an adequate reflection on their consequences and from the exploration of more suitable ways to apply them in an increasingly interconnected and plural job market, study, and life environment.

References

> Bonaiuti, G. (2014). *Le strategie didattiche*. Carocci.
> Bonwell, C. & Eison, J. (1991). *Active Learning: Creating Excitement in the Classroom*. 1991 ASHE-ERIC Higher Education Reports.
> Christensen, B.T., Ball, L.J. & Halskov, K. (2017). *Analysing design thinking: Studies of cross-cultural co-creation*. CRC Press
> Ferraris, S.D. & Mattioli F. (2020). The Use of English as Lingua Franca in Cross-Cultural Classes: a Case Study. In DS 104: *Proceedings of the 22nd International Conference on Engineering and Product Design Education*. VIA University, Herning (DK).
> Gautam, V. (2012). *Influence of cultural characteristics on designers' approaches-an empirical study*. TU Berlin.
> Gómez Puente, S. M. (2014). *Design-based learning: exploring an educational approach for engineering education*. Eindhoven University of Technology.
> Lee, D.Y., Ha, J.Y. & Fairfax, D. (2016). Cross-cultural design (CCD) learning reflective tool based on UK and Korea's collaborative design projects. *Proceedings of International Design Conference, DESIGN (Vol. DS 84)*.
> Matthews, R.S., Cooper, J.L., Davidson, N. & Hawkes, P. (1995). Building Bridges Between Cooperative and Collaborative Learning. *Change: The Magazine of Higher Learning, 27(4), 35–40*.
> Mattioli, F. & Rampino, L. (2020). An Active Learning Approach for a Design Thinking Course. In DS 104: *Proceedings of the 22nd International Conference on Engineering and Product Design Education. VIA University, Herning (DK)*.
> Murdoch-Kitt, K.M. & Emans, D.J. (2020). *Intercultural Collaboration by Design Drawing from Differences, Distances, and Disciplines Through Visual Thinking*. Routledge.
> Panitz, T. (1999). *Collaborative versus Cooperative Learning: A Comparison of the Two Concepts Which Will Help Us Understand the Underlying Nature of Interactive Learning*. ERIC.
> Penati, A. & Seassaro, A. (2000). *Didattica&Design*. Edizioni POLI.design
> Poggenpohl, S.H. (2004). Practicing Collaboration in Design. *Visible Language, 138–157*.
> Poggenpohl, S.H. & Sato, K. (2009). *Design integrations: research and collaboration*. Intellect Books.
> Sancassani, S., Brambilla, F., Casiraghi, D. & Marenghi, P. (2019). *Progettare l'innovazione didattica*. Pearson.
> Savin-Baden, M. & Major, C.H. (2004*). Foundations of problem-based learning*. Society for Research into Higher Education & Open University Press.
> Spiro, J. (2014). Learning Interconnectedness: Internationalisation through Engagement with One Another. *Higher Education Quarterly, 68(1), 65–84*.
> Tracey, M.W. & Boling, E. (2014). Preparing instructional designers: Traditional and emerging perspectives. *In Handbook of Research on Educational Communications and Technology: Fourth Edition*.
> Trahar, S. & Hyland, F. (2011). *Higher Education Research & Development Experiences and perceptions of internationalisation in higher education in the UK Experiences and perceptions of internationalisation in higher education in the UK*.
> Wilson, S. & Zamberlan, L. (2015). Design for an Unknown Future: Amplified Roles for Collaboration, New Design Knowledge, and Creativity. *Design Issues, 31(2), 3*.