AN INCLUSIVE APPROACH TO INSPIRE CREATIVITY AND TEAM BUILDING THROUGH MODULAR ARCHITECTURE DRAWING

EDUCATION AND NEW DEVELOPMENTS 2025

Volume 1

Edited by

Mafalda Carmo

Designed by Freepik

WIARS
World Institute for Advanced Research and Science

Education and New Developments

2025

Volume 1

Edited by

Mafalda Carmo

Edited by Mafalda Carmo, World Institute for Advanced Research and Science (WIARS), Portugal

Published by inScience Press, Rua Tomas Ribeiro, 45, 1º D, 1050-225 Lisboa, Portugal

ISSN (electronic version): 2184-1489
ISSN (printed version): 2184-044X
ISBN: 978-989-35728-7-0

Legal Deposit: 428062/17
Printed in Lisbon, Portugal by GIMA - Gestão de Imagem Empresarial, Lda.

BRIEF CONTENTS

FOREWORD

Dear Colleagues,

This book contains the full text of papers and posters presented at the International Conference on Education and New Developments (END 2025), organized by the World Institute for Advanced Research and Science (WIARS).

Education is a fundamental right that accompanies us from the very beginning of our lives. It encompasses every experience we encounter, influencing and shaping our thoughts, emotions, and actions. Whether we engage in formal education within classrooms or learn from the world around us, the process of acquiring knowledge plays a vital role in our personal growth and development. It equips us with the tools to navigate the complexities of life, broadens our perspectives, and empowers us to make informed decisions. This International Conference seeks to provide some answers and explore the processes, actions, challenges and outcomes of learning, teaching and human development. Our goal is to offer a worldwide connection between teachers, students, researchers and lecturers, from a wide range of academic fields, interested in exploring and giving their contribution in educational issues.

We are delighted to have successfully facilitated connections among academics, scholars, practitioners, and individuals who share a common interest in a field abundant with fresh perspectives, ideas, and knowledge. Our event has attracted a diverse range of contributors and presenters, enriching our understanding of human nature and behavior by showcasing the influence of their unique personal, academic, and cultural backgrounds. This diversity is a testament to the international reach of our conference, fostering multi-disciplinary collaborations and fostering intellectual growth and exchange.

END 2025 received 704 submissions, from more than 45 different countries, reviewed by a double-blind process. Submissions were prepared to take form of Oral Presentations, Posters, Virtual Presentations and Workshops. The conference accepted for oral presentation 264 submissions (38% acceptance rate).

The conference also includes one Keynote presentation by Dr. Diane Boothe, Boise State University, USA. We would like to express our gratitude to our invitee.

This conference addressed different categories inside the Education area and papers are expected to fit broadly into one of the named themes and sub-themes. To develop the conference program, we have chosen four main broad-ranging categories, which also covers different interest areas:

• In **TEACHERS AND STUDENTS**: Teachers and Staff training and education; Educational quality and standards; *Curriculum* and Pedagogy; Vocational education and Counselling; Ubiquitous and lifelong learning; Training programs and professional guidance; Teaching and learning relationship; Student affairs (learning, experiences and diversity; Extra-curricular activities; Assessment and measurements in Education.

• In **PROJECTS AND TRENDS**: Pedagogic innovations; Challenges and transformations in Education; Technology in teaching and learning; Distance Education and eLearning; Global and sustainable developments for Education; New learning and teaching models; Multicultural and (inter)cultural communications; Inclusive and Special Education; Rural and indigenous Education; Educational projects.

• In **TEACHING AND LEARNING**: Critical, Thinking; Educational foundations; Research and development methodologies; Early childhood and Primary Education; Secondary Education; Higher Education; Science and technology Education; Literacy, languages and Linguistics (TESL/TEFL); Health Education; Religious Education; Sports Education.

• In **ORGANIZATIONAL ISSUES**: Educational policy and leadership; Human Resources development; Educational environment; Business, Administration, and Management in Education; Economics in Education; Institutional accreditations and rankings; International Education and Exchange programs; Equity, social justice and social change; Ethics and values; Organizational learning and change, Corporate Education.

The contributions were published across two volumes, and this is the Volume 1 of the book titled Education and New Developments 2025, that showcases the outcomes of dedicated research and developments undertaken by authors who are driven by their passion to enhance research methods that directly relate to teaching, learning, and the practical applications of education in the present day. Within its pages, you will find a diverse array of contributors and presenters of contributors and presenters who expand our understanding of educational matters by sharing their unique personal, academic, and cultural perspectives. Through their valuable insights and experiences, they enrich our exploration and contribute to the growth of educational discourse in our contemporary world.

This first volume only focuses on the main areas of TEACHERS AND STUDENTS and TEACHING AND LEARNING, being the contributions of the other two areas published in Volume 2.

We would like to express thanks to all the authors and participants, the members of the academic scientific committee, and of course, to our organizing and administration team for making and putting this conference together.

Hoping to continue the collaboration in the future.

Respectfully,

Mafalda Carmo
World Institute for Advanced Research and Science (WIARS), Portugal
Conference and Program Chair

ORGANIZING AND SCIENTIFIC COMMITTEE

Organizer

World Institute for Advanced Research and Science (WIARS)
www.wiars.org

Conference and Program Chair

Mafalda Carmo
World Institute for Advanced Research and Science (WIARS), Portugal

International Scientific Committee

Aaron R. Deris, Minnesota State University, USA

Abha Gupta, Old Dominion University, USA

Adanela Musaraj, Indiana Tech, USA

Adel Jebali, Concordia University, Canada

Adrian Ponz Miranda, Zaragoza University, Spain

Ahmet Ok, Middle East Technical University, Turkey

Alan Singer, Hofstra University, USA

Ali Ahmad Al-Barakat, University of Sharjah, United Arab Emirates

Ana Conboy, College of Saint Benedict and Saint John's University, USA

Ana Hernández, Universidad Autónoma de Madrid, Spain

Ana Pongrac Pavlina, University of Zagreb, Croatia

Ana-Maria Bercu, Alexandru Ioan Cuza University of Iasi, Romania

Andis Klegeris, University of British Columbia Okanagan, Canada

Andrea Bencsik, University of Pannonia Veszprem, Hungary

Andrea Fiorucci, University of Salento, Italy

Andreas Zehetner, University of Applied Sciences Upper Austria, Austria

Andrei Nastas, Lower Danube University, Romania

Angela Piu, University of Valle D' Aosta, Italy

Angelica-Lizeth Sanchez-Lopez, Tecnológico De Monterrey, Mexico

Anja María Mackeldey, Colegio Alemán Medellín / Universidad de Antioquia, Colombia

Antoni Kolek, Kozminski University, Poland

Antonija Huljev, University of Osijek, Croatia

Aphrodite Ktena, National and Kapodistrian University of Athens, Greece

Asta Vaitkevičienė, Vilnius University, Lithuania

Aurelija Dauksaite-Kolpakoviene, Vytautas Magnus University, Lithuania

Barba Aldis Patton, University of Houston-Victoria, USA

Beata Maslanka-Wieczorek, Polish-Japanese Academy of Information Technology, Poland

Beatriz Carrasquer Alvarez, Zaragoza University, Spain

Begona Sampedro, Univesity of Cordoba, Spain

Binshan Lin, Louisiana State University Shreveport, USA

Birgit Schmiedl, University College of Teacher Education Lower Austria, Austria

Bojana Culum Ilic, University of Rijeka, Croatia

Borislava Kirilova, Sofia University, Bulgaria

Borja Manzano Vázquez, University of Granada, Spain

Burcu Koc, Sakarya University, Turkey

Carola Hernandez, Universidad de los Andes, Colombia

Carolina Bodea Hategan, Babes-Bolyai University, Romania

Celina Da Silva, York University, Canada

Cezar Scarlat, University "Politehnica" of Bucharest, Romania

Chantal Ouellet, Universite du Quebec a Montreal, Canada

Charalampos Karagiannidis, University of Thessaly, Greece

Chiara Uliana, University of Granada, Spain

Chien-Ming Cheng, National Academy for Educational Research, Taiwan

Cory A. Bennett, Idaho State University, USA

Cristiana Pizarro Madureira, ESECS – Instituto Politécnico de Leiria, Portugal

Cristiano Luchetti, American University of Ras Al Khaimah, United Arab Emirates

Dale Kirby, Memorial University, Canada

Dalia Hanna, Sheridan College, Canada

Damijana Kerzic, University of Ljubljana, Slovenia

David Aparisi, University of Alicante, Spain

David Cline, Saginaw Valley State University, USA

David Nocar, Palacky University Olomouc, Czech Republic

Diana Straksiene, Vilnius University, Siauliai Academy, Lithuania

Diana Maria Cismaru, National University of Political Studies and Public Administration, Romania

Diane Boothe, Boise State University, USA

Dijana Drandic, Juraj Dobrila University of Pula, Croatia

Dijana Oreški, University of Zagreb, Croatia

Dimitris Kilakos, National & Kapodistrian University of Athens, Greece

Dorina Anca Talas, Babes-Bolyai University, Romania

Dorota Gawryluk, Bialystok University of Technology, Poland

Elena Baguzina, Moscow State Institute of International Relations, Russian Federation

Elena Garcia Guerrero, University of Granada, Spain

Elena Seghedin, Alexandru Ioan Cuza University from Iasi, Romania

Emmanouil Choustoulakis, University of Peloponnese, Greece

Eva Patrikakou, Depaul University, USA

Eva Trnová, Masaryk University, Czech Republic

Evangelina Bonifácio, Polytechnic Institute of Bragança, Portugal

Fabiana Leta, Universidade Federal Fluminense, Brazil

Fernando Martin Villena, Universitat Pompeu Fabra, Spain

Gabriella Velics, Eotvos Lorand University, Hungary

Georgiana Ciobotaru, Dunarea de Jos University of Galati, Romania

Gianluca Carella, Politecnico di Milano, Italy

Gibrán Aguilar Rangel, Autonomous University of Queretaro, Mexico

Gina Aurora Necula, Dunarea de Jos University of Galati, Romania

Grainne Ni Dhomhnaill, University College Dublin, Ireland

Gyongyi Bujdoso, University of Debrecen, Hungary

Hana Vancova, Trnava University, Slovakia

Hashini Mohottala, University of Hartford, USA

Héctor Tronchoni, Florida Universitaria in Catarroja, Spain

Helin Puksand, Tallinn Univesity, Estonia

Henri Jacobs, Central University of Technology, Free State (CUT), South Africa

Igor Miladinovic, University of Applied Sciences Campus Vienna, Austria

Ilijana Cutura, University of Kragujevac, Serbia

Ina Blau, The Open University of Israel, Israel

Ioana Letitia Serban, Babes-Bolyai University, Romania

Ioannis Makris, State Special School / Directorate of Secondary Education West Athens, Greece

Irena Petrusic, University Adriatic, Montenegro

Janaina Cardoso, Rio de Janeiro State University, Brazil

Javier Casanoves-Boix, University of Valencia, Spain

Jeannette Jones, Texas Lutheran University, USA

Jenni Sanguiliano Lonski, Rollins College, USA

Jitka Hlouskova, Independent Education Professional, Czech Republic

Joanna Paliszkiewicz, Warsaw University of Life Sciences, Poland

John Blake, University of Aizu, Japan

John Smallwood, Nelson Mandela University, South Africa

Jorge Viguri Cordero, Universitat Jaume I, Spain

Jose Augusto Oliveira Huguenin, Universidade Federal Fluminense, Brazil

Juana M. Ortega Tudela, University of Jaén, Spain

Juana Maria Sancho Gil, University of Barcelona, Spain

Jurgita Lenkauskaite, Siauliai University, Lithuania

Kadi Lukanenok, Tallinn University, Estonia

Kalliopi Trouli, University of Crete, Greece

Karel Němejc, Czech University of Life Sciences Prague, Czech Republic

Katerina Vitásková, Palacky University in Olomouc, Czech Republic

Kavita Karan, Southern Illinois University Carbondale, USA

Krešimir Pavlina, University of Zagreb, Croatia

Kyparisia Papanikolaou, School of Pedagogical and Technological Education, Greece

Ladario da Silva, Universidade Federal Fluminense (UFF), Brazil

Laura Rio, University of Bologna, Italy

Lee Ann Rawlins Williams, University of North Dakota, USA

Leela Ramsook, University of Trinidad and Tobago, Trinidad and Tobago

Lefkothea Kartasidou, University of Macedonia, Greece

Lefkothea-Vasiliki Andreou, University of Ioannina, Greece

Leila Kajee, University of Johannesburg, South Africa

Lela Abdushelishvili, International Black Sea University, Georgia

Les Sztandera, Thomas Jefferson University, USA

Liga Paula, Latvia University of Life Sciences and Technologies, Latvia

Lisa Winstead, California State University, USA

Loredana Terec-Vlad, Stefan Cel Mare University from Suceava and Lumen, Romania

Loreta Chodzkiene, Vilnius University, Lithuania

Lucia Dancisinova, University of Presov, Slovakia

Luis Gonzaga Roger Castillo, Universidad de Granada (UGR) / Centro de Estudios, Spain

Magdolna Chrappán, University of Debrecen, Hungary

Magne V. Aarset, NLA University College, Norway

Maia Chkotua, International Black Sea University, Georgia

Maira Lescevica, Vidzeme University of Applied Sciences, Latvia

Maja Kerneza, University of Maribor, Slovenia

Malgorzata Cieciora, Polish-Japanese Academy of Information Technology, Poland

Manfred Meyer, Westfalische Hochschule, Germany

Manuel Fernández-Alcántara, University of Alicante, Spain

Marcin Fojcik, Western Norway University of Applied Sciences, Norway

Maria Gonzalez Alriols, University of the Basque Country, Spain

Maria Lopes de Azevedo, Polytechnic Institute of Portalegre, Portugal

Maria Orfila, Rey Juan Carlos University, Spain

Maria Carme Boqué Torremorell, Ramon Llull University, Spain

María José Latorre, University of Granada, Spain

Marko Slavkovic, University of Kragujevac, Serbia

Marta Talavera, University of Valencia, Spain

Marzena Wojcik-Augustyniak, University of Siedlce, Poland

Matthias Baume, Technical University of Munich, Germany

Mayara de Carvalho Santos, State University of Campinas, Brazil

Melissa Caspary, Georgia Gwinnett College, USA

Michael Reiner, IMC University of Applied Sciences Krems, Austria

Michael Wagner, Drexel University, USA

Michail Kalogiannakis, University of Thessaly, Greece

Mike Green, University of Kent, UK

Milan Kubiatko, J. E. Purkyne University, Czech Republic

Mohammad Ahmad Abdeldayem, Zagazig University, Egypt

Monica Maier, Technical University of Cluj-Napoca, Romania

Monika Mladenovic, University of Split, Croatia

Nadja Cekolj, University of Rijeka, Croatia

Napak-On Sritrakarn, Acknowledge Education, Australia

Natalia Casado, University King Juan Carlos, Spain

Natalie Lavoie, University of Quebec in Rimousk, Canada

Natasa Vlah, University of Rijeka, Croatia

Nazario Zambaldi, Free University of Bolzano, Italia

Ned Ladd, Bucknell University, USA

Nicolás Ruiz-Robledillo, University of Alicante, Spain

Noam Topelberg, Bar Ilan University, Israel

Nora Gavira-Durón, Universidad de las Americas Puebla, Mexico

Olga Dorul, Dunarea De Jos University of Galati, Romania

Omid Noroozi, Wageningen University & Research, The Netherlands

Onur Ergünay, Izmir Democracy University, Turkey

Patrik Schulcz, Esade Business School (Ramon Llull University), Spain

Pavel Brebera, University of Pardubice, Czech Republic

Pavlina Rackova, University of Defence, Czech Republic

Pawel Pokutycki, Royal Academy of Art (KABK), The Hague, The Netherlands

Petros Kefalas, University of York Europe Campus, Greece

Pule Phindane, Central University of Technology, South Africa

Raluca Trifu, UMF Iuli Hatieganu from Cluj Napoca, Romania

Xénia Liashuk, Trnava University, Slovakia

Xiaoyuan Suo, Webster University, USA

Xiaozhu Lin, Politecnico di Milano, Italy

Yevgeniya Daineko, International IT University, Kazakhstan

Youngsoon Kim, Inha University, South Korea

Zoltán Rónay, Eotvos Loránd University, Hungary

SPONSOR

http://www.wiars.org

KEYNOTE LECTURE

"REIMAGINING CROSS-DISCIPLINARY ACTIVE LEARNING METHODOLOGIES TO ENGAGE EFL STUDENTS"

Dr. Diane Boothe
Director of P-20 Outreach and Professor, Department of Literacy, Language and Culture, College of Education, Boise State University, USA

Abstract

The continued demand and unique learning environment for English as a Foreign Language (EFL) learners is ever changing as educators focus on best practices to promote optimal learning for 21st century students and meet the needs of our complex interdisciplinary globalized world. Central to the demand for revitalizing the classroom experience is to prepare students to enter the evolving workforce. Cutting-edge EFL skills are often tantamount to achieving success in this endeavor and keeping up with the rapid pace of learning. Not only are EFL students expected to demonstrate observable and measurable English skills, but there is a growing interest and stipulation to demonstrate strengths critical to cross-disciplinary fields as well as collaborative active learning methods. This address investigates student-centered instructional methods that focus on the multidimensional perspectives of active learning environments. Experiences from a variety of disciplines will be highlighted including Science, Technology, Engineering and Mathematics (STEM), emphasizing direct EFL preparation to ensure success and promote purposeful collaboration and engaged English learning. Dynamic teaching strategies and methodologies focusing on active, hands-on learning will be discussed. Challenging student-centered activities will be suggested that can be adjusted for a variety of abilities across age groups featuring key transferable English language competencies. Exploration of best practices that build a culture of innovation and prepare students for EFL content areas will be addressed.

Keywords: *Cross-disciplinary, student-centered, interdisciplinary, multidimensional, competencies.*

Biography

Diane Boothe is Professor of Literacy, Language and Culture at Boise State University, and served as Dean of the College of Education from 2005-2014. Prior to coming to Boise State University, she was the Department Chair of Curriculum and Instruction and Professor at the University of West Georgia. She served as a bilingual teacher, and elementary and middle school principal. Diane has worked consistently with multilingual populations to bring about change and support the development of innovative educational programs and policies. She creates collaborative partnerships and fosters positive relationships with the community, schools, and agencies that she serves. She received her Doctor of Public Administration degree from the University of Southern California. Her primary research efforts have been in the areas of English Language Learning, Multilingual Education, Diversity and Comparative Education Systems. She coauthored a book titled In the Eyes of the Beholder: Critical Issues for Diversity in Gifted Education, focusing a chapter on gender and gifted females when identifying the multidimensional perspectives of giftedness. Diane has served in leadership positions as the President of Georgia Teachers of English to Speakers of Other Languages (TESOL), the TESOL International Higher Education Chair, the TESOL International Nominating Committee, and, for ten years, as the editor of the TESOL in Action Journal. She has been selected as the keynote or featured speaker and delivered the plenary session for international and national conferences.

INDEX OF CONTENTS

ORAL PRESENTATIONS

Teachers and Students

POSTERS

Teachers and Students

Teaching and Learning

VIRTUAL PRESENTATIONS

Teachers and Students

WORKSHOPS

AN INCLUSIVE APPROACH TO INSPIRE CREATIVITY AND TEAM BUILDING THROUGH MODULAR ARCHITECTURE DRAWING

Francesca Maria Ugliotti, Michele Zucco, & Margherita Cassis
Department of Structural, Geotechnical and Building, Politecnico di Torino (Italy)

Abstract

Integrating pedagogical innovations and inclusive approaches in university education represents a meaningful strategy to foster active and cooperative learning. Developing transversal skills such as collaboration and critical problem-solving is essential for the technical professions, such as engineers and architects, who face the increasingly complex problems of this millennium. This article describes a team-building experience as part of a first-year course in Building Drawing at Politecnico di Torino, aiming to enhance transversal skills and foster interaction between students from heterogeneous backgrounds. The experiential activity proposes a creative challenge in the field of modular architecture by using the 3D-printed basic element proposed by the architect Walter Gropius. The analysis of the results, conducted using questionnaires and qualitative observations, showed improved relational skills and strengthened student motivation. This experience shows how innovative teaching methodologies can contribute to academic success and prepare students to manage group dynamics in the professional context of building engineering.

Keywords: *Creative design experience, 3D printing, active learning, student engagement, higher education.*

1. Introduction

In recent years, team-building activities have emerged as effective tools for improving group dynamics and transversal skills in educational contexts, including university programs. In the field of building engineering, where multidisciplinary collaboration is a fundamental requirement for professional practice, the ability to work in teams is as crucial as technical expertise. However, traditional university courses tend to favour an individualistic approach to learning, overlooking the potential of cooperative methodologies in enhancing both student engagement and their preparation for the workforce. The scientific literature highlights that integrating team-building experiences into higher education can improve academic performance, foster a sense of belonging to the group, and enhance communication skills (Oakley et al., 2004). Recent studies show that approaches such as cooperative learning (Johnson & Johnson, 2017) and problem-based learning promote active learning and collaborative problem-solving for complex issues, thereby improving teamwork management skills. In particular, experiences in the engineering field have demonstrated that practical exercises and project challenges based on collaboration increase student motivation and engagement. Within this context, the present study describes a team-building activity designed for first-year Building Engineering students to develop transversal skills and promote a more cooperative learning process.

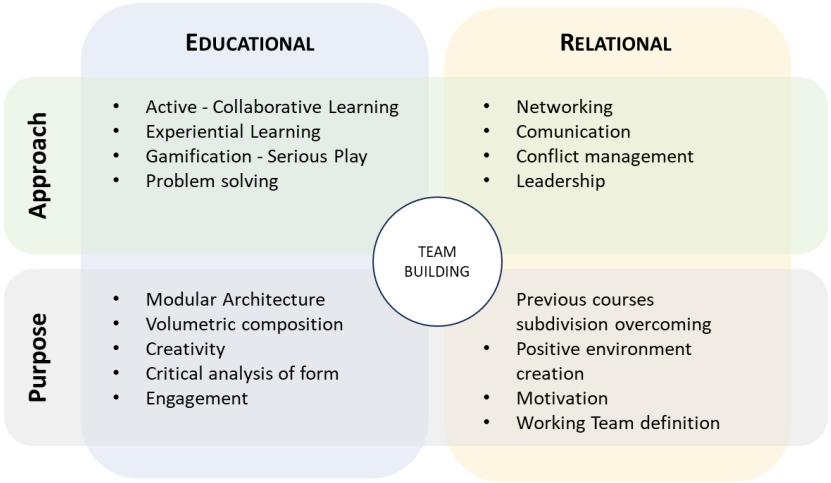
2. Methods

The team-building approach was experienced in the Building Drawing course at Politecnico di Torino, which lays the methodological foundations of Drawing as a communication language for engineers. As the first core course of the Building Engineering Bachelor's program, it brings together students who were previously distributed according to different criteria. Concerning this point, the objective of the experiential activity is to establish a collaborative environment and foster students' mutual acquaintance. These aspects are considered essential both for the course, which involves practical work in groups and for establishing effective interpersonal relationships that are fruitful for subsequent teaching. Sixty-five students from diverse educational backgrounds, including high schools, technical institutes, and surveyor schools, attended the experience.

p-ISSN: 2184-044X e-ISSN: 2184-1489 ISBN: 978-989-35728-7-0 © 2025

The participatory activity proposes a creative challenge in the field of modular architecture and involves the definition of volumetric forms using the basic modules proposed by the architect Walter Gropius (Seelow, 2018). It has been designed with the dual objective of strengthening the educational experience and developing relational skills, as summarized in Figure 1.

Figure 1. Methodological approach.



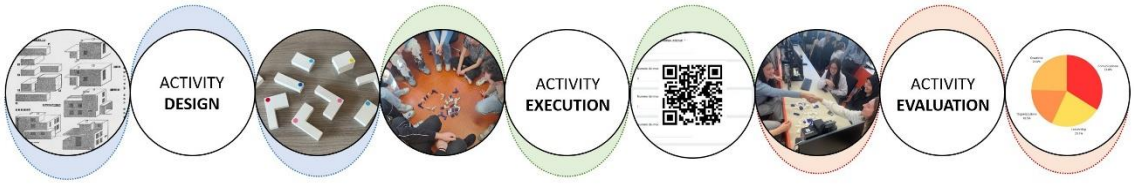
From a pedagogical perspective, adopting active approaches within the course (Ugliotti et al., 2023) is investigated to directly involve students in the educational process, stimulating their participation, reflection, and collaboration. Various techniques such as collaborative and experiential learning, gamification and serious play, and problem solving have been integrated into the experience to establish a synergy between theory and practice in order to facilitate the simultaneous development of disciplinary and transversal soft skills.

Engaging in active learning experiences compels students to confront and solve complex problems in collaborative contexts, thereby stimulating critical thinking, and adaptability. In this case, the activity was also able to foster the critical analysis of form, creativity, volumetric composition, and the use of modular architecture, prompting a deep reflection on expressive and constructive methodologies.

This type of learning impacts on the relational dimension of the students, stimulating skills of communication and networking and bringing out the predisposition to leadership and the need for conflict management. Creating a positive environment, and cultivating shared motivation contribute to forming cohesive and functional workgroups thereby rendering the team building experience a central and transversal component of the educational journey that integrates pedagogical goals with relational needs.

The activity involved three main phases: an initial design phase, a practical execution phase, and a subsequent evaluation phase (Figure 2).

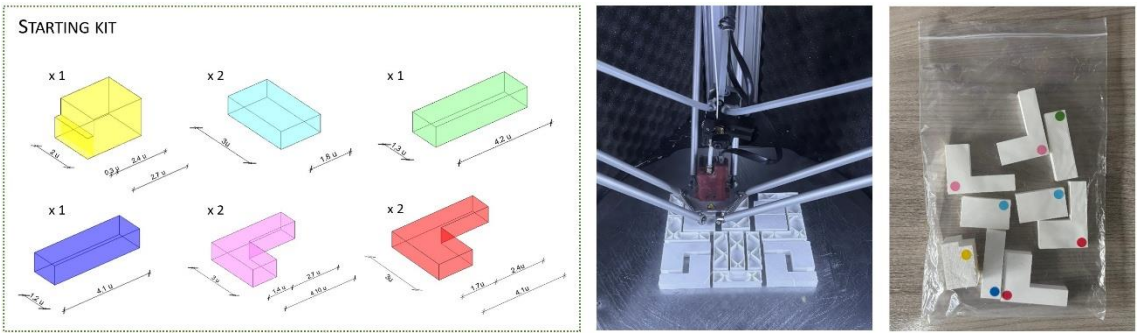
Figure 2. Activity phases.



2.1. Design of the activity

The preparatory phase of the activity entailed the digitalization of Walter Gropius's 1922 "Baukasten im Großen" modular forms, which were modeled in 3D using Autodesk Revit software. A basic kit consisting of 9 modules was then defined and 40 identical kits were printed via a 3D printer. A simulation conducted with a small group of individuals allowed for the optimal organization of timing, scheduling and dynamics of the activity, identifying its strengths and proactively addressing its weaknesses.

Figure 3. Design phase.

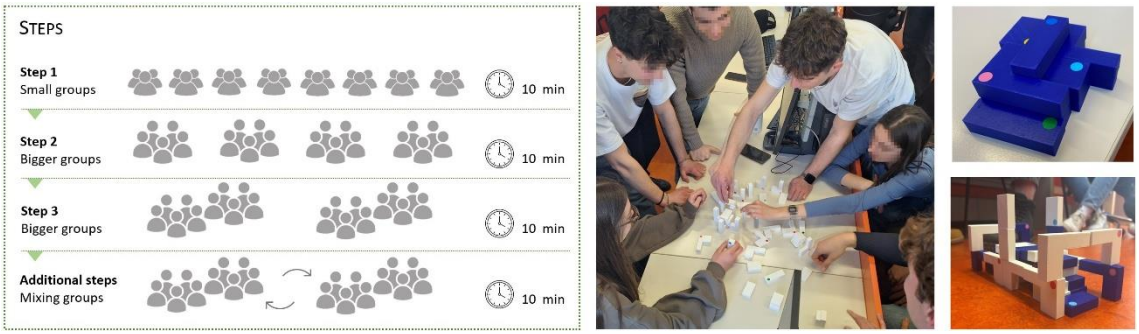


2.2. Execution of the activity

The team-building activity was structured into multiple phases. Initially, the students were divided into groups of two or three individuals based on their physical proximity to each other. Each group was provided with a starter kit and given specific instructions to assemble the modules into free compositions. To ensure a comprehensive record of the activity, each composition created was meticulously documented via the completion of a form specifying the students' names, the number and type of pieces used, the name given to the composition, and the attachment of a photograph. In the subsequent stage of the experiment, the small groups were joined two by two, thereby providing the students with the opportunity to construct using twice the number of modules. The groups were then further reunited without utilizing the logic of proximity, with the aim of fostering new interactions and increasing the number of available pieces. In the following phases, the groups were reorganized without increasing the number of participants, with the sole objective of facilitating interactions among as many individuals as possible.

Each phase lasted 10 minutes, in every phase each composition was documented using the form.

Figure 4. Activity execution.



2.3. Evaluation of the activity

During the activity, the teacher and collaborators paid special attention to qualitative observations of the dynamics among the students and the effectiveness of the planned task. Moreover, a questionnaire was administered to the students at the end of the last session to gather impressions of the teaching approach used and understand the level of engagement achieved.

3. Discussion

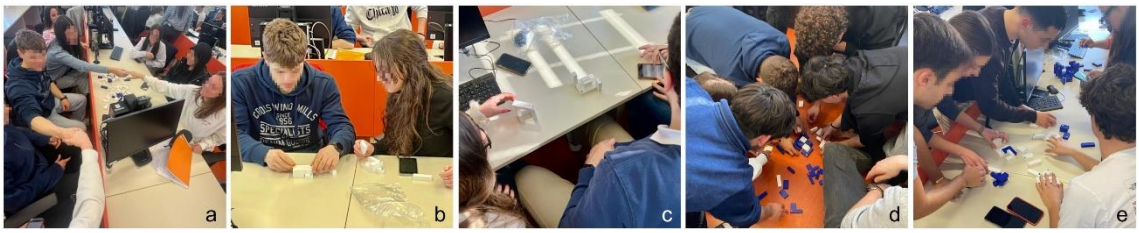
The team-building experience revealed several relational dynamics with important pedagogical and social implications. During the activity, the teacher and her collaborators observed that, through a spontaneous presentation phase (Figure 5. a), participants overcame interpersonal barriers, fostering a climate of openness and reciprocity.

From the first phase, devoted to small group formation, different approaches to problem solving emerged. Most participants adopted active collaboration (Figure 5. b), while in some cases a more individualistic approach was observed (Figure 5. c), in which each member focused independently on his or her own construction, emphasizing personal operational styles. In later stages, and thus with larger groups, the relational approach took on even more diverse forms. Some groups adopted parallel methods that facilitated a synergistic and equitable distribution of tasks (Figure 5. d), while others experimented

with sequential strategies (Figure 5. e) in which one segment of the group devoted itself to constructing the form and another to prototyping the composition.

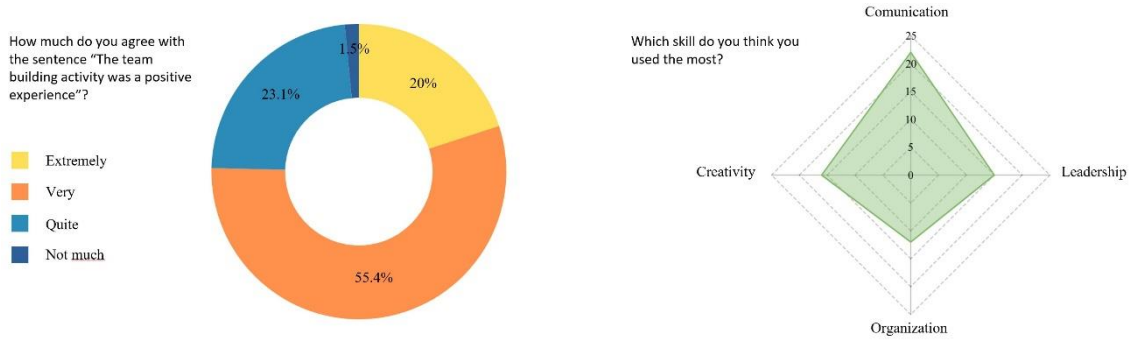
The latter dynamic is symptomatic of a spontaneous predisposition to effective coordination. Just in a few isolated cases, a lack of engagement by some participants was observed, highlighting the need to implement motivational and inclusive strategies, as well as to create an environment more conducive to collaborative activities, in order to encourage active participation and the development of optimal group dynamics.

Figure 5. Main relational dynamics observed.



The post-activity questionnaire highlighted additional experiential and relational dynamics. Over 75% of participants rated the experience as extremely or very positive. In addition, communication and creativity emerged as the most frequently utilized soft skills, proving to be essential for effective teamwork and problem-solving (Figure 6).

Figure 6. Valuation form results.



On the whole, these operational strategies contributed significantly to the development of key relational competencies and soft skills, including communication, networking, conflict management, and leadership. Such skills are indispensable for fostering cohesive and efficient teams in educational contexts, while simultaneously providing valuable preparation for the future Building Engineer.

4. Conclusions

This study has documented and analyzed, from a pedagogical perspective, a team-building activity aimed at enhancing transversal skills and fostering interaction among students from diverse backgrounds. The creative challenge, set in the context of modular architecture, involved the use of building modules inspired by Gropius' designs, modeled and 3D printed, offering participants the opportunity to reinterpret architectural space in their own personal way. In addition, it allowed them to investigate the compositional, graphic, and spatial principles that serve as its theoretical and practical underpinnings.

This approach fostered significant social interaction, stimulating empathy and the ability to critically tackle complex design challenges through dialogue and cooperation. The results highlight a marked improvement in relational and collaborative skills, along with a notable enhancement of creativity made tangible through the use of 3D printing. Furthermore, it is evident that the instructor's role has undergone a progressive transformation, from that of a mere transmitter of knowledge to a designer of comprehensive learning experiences that effectively maximize active student engagement.

Overall, this pedagogical model, replicable in various educational settings, significantly contributes to the discourse on educational innovation, demonstrating how advanced technological tools and interdisciplinary approaches can develop academic and relational competencies on solid, critical, and collaborative foundations, break the monotony of passive listening, and promote widespread, conscious participation.

Acknowledgments

The authors are pleased to thank all the students of the Building Drawing course of the first year of Building Engineering of the Politecnico di Torino who participated enthusiastically in this advanced didactic experimentation.
This contribution is the result of a common work of the Authors. However, specific sections can be attributed as follows: F.M.U. authored the Abstract, Introduction, and Evaluation of the Activity; F.M.U. and M.Z. worked on the Methods; M.C. was responsible for the Activity Design and Execution; M.Z. contributed to the Discussion and the Conclusions

References

Johnson, D. W., & Johnson, R. T. (2017). Cooperative learning: The foundation for active learning. *Active Learning—Beyond the Future* (pp. 13-30). Springer.

Oakley, B., Felder, R. M., Brent, R., & Elhajj, I. (2004). Turning student groups into effective teams. *Journal of Student-Centered Learning, 2*(1), 9-34.

Prince, M. (2004). Does Active Learning Work? A Review of the Research. *Journal of Engineering Education, 93*(3), 223-231. https://doi.org/10.1002/j.2168-9830.2004.tb00809.x

Seelow, A. M. (2018). The Construction Kit and the Assembly Line—Walter Gropius' Concepts for Rationalizing Architecture. *Arts, 7*(4), 95. https://doi.org/10.3390/arts7040095

Ugliotti, F. M., & Zucco, M. (2023). Foster teacher-student interaction in the classroom and active learning through instant polling within the framework of drawing courses. *Proceedings of 16th annual International Conference of Education, Research and Innovation,* 2349-2358. https://doi.org/10.21125/iceri.2023.0647

AUTHOR INDEX