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MAPPING THE USE OF ACTIVE LEARNING APPROACHES AT THE UNIVERSITY OF PADOVA

Mapping the use of Active Learning approaches at the University of Padua

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Executive Summary

Considering the growing recommendation for the implementation of active learning practices in higher education, we have conducted a mapping study of the current practices and approaches used by teachers of undergraduate and integrated master's courses at the University of Padua (UNIPD) during the 2022/2023 academic year. The project aimed to identify teaching-learning approaches, collecting teachers' perceptions about the factors that influence the adoption of active learning practices.

Introduction

Quality teaching in higher education and the associated necessity to enhance faculty development (FD) in that direction have been subjects of global debate for the past three decades. In the aftermath of the pandemic, it has become evident that the efforts made in this direction, especially in the adoption of digital technologies, have been inadequate in implementing active and participatory teaching methods aimed at facilitating transformation, emancipatory, and agentic learning experiences (Cruz & Grodziak, 2021; De Rossi, 2023).

The scholarly literature, based on case studies and FD planning approaches, is currently flourishing (De Rossi & Fedeli, 2022). In this regard, the implementation of faculty development cannot be limited to inspirational activities or structured courses alone (Bahar-Ozvaris et al., 2004; Fernandez & Audétat, 2019). It requires structural interventions, combined with the expertise and professionalism of the teaching staff. Faculty should be empowered to effect operational changes through appropriate training, which should be viewed as a continuous and systematic process integrated into institutional projects (De Rossi & Fedeli, op.cit).

To guarantee the meaningfulness of innovations in faculty development, a meticulous initial examination of the context is necessary. Following this, there should be an ongoing evaluation of the investments made and the anticipated results in terms of professional development, motivation, and the efficient use of tools and resources in the classroom (Steinert, 2020).

Most importantly, there is a need to evaluate students' engagement, participation, satisfaction, and learning achievements after supporting academic teachers to apply new teaching methods, verifying the validity of the training proposals and their technical management as well as their sustainability.

It has been considered that generating educational data, as well as sharing it to improve teaching and learning processes and practices, could be part of a culture of quality (Ehlers, 2009; Raffaghelli et al., 2021). In this regard, the growing digitization of teaching and learning could support developmental processes (from management systems to assessment) by adopting data-driven practices. In the era of AI, data collection, analysis, and interpretation could be mainstreamed into the academic community to foster awareness of the quality of the pedagogies and resources adopted. Nonetheless, this is a double-edged sword since data-driven practices need to be carefully connected with organisational processes and culture (Raffaghelli et al, op. cit). As a result, the adoption of data-informed systems is not a "take-out-of-the-shelf" solution. It consists of tailored instruments that create new spaces for participation. Furthermore, a data culture in higher education should encourage reflection on teaching and learning practices, the quality system, and the university's overall performance (*What is measured? For what purposes?*).

In this context, the University of Padua (UniPd) has established a Faculty Development Programme known as "Teaching4Learning@Unipd" (T4L). This program was launched in 2016 (De Rossi & Fedeli, 2022). The T4L activities are designed to introduce teachers to active learning methods, with a focus on placing students at the center of the learning experience (De Marchi, 2023, p. 13). These activities are categorized into specific courses tailored for the different levels of teaching experience (New Faculty, Base, Advanced, and Change Agents Levels). They aim at progressively developing more complex competencies for teaching, ranging from basic knowledge and understanding to the implementation of pedagogical strategies to providing institutional support to peers for developing student-centered approaches.

The program is expanding in various directions. For instance, it includes the organization of workshops focused on specific teaching methodologies or technologies. Moreover, the program fosters opportunities for faculty members to exchange experiences, such as through peer observation experiences or meetings to share good practices. The initiative also involves creating valuable resources and materials to consolidate and share experiences across disciplines and beyond the university's boundaries. This includes the development of MOOCs (Massive Open Online Courses), videos, and podcasts. Furthermore, funding disciplinary teaching improvement projects is aimed at supporting bottom-up and informal learning opportunities among peers. These efforts contribute to the continuous growth and enrichment of the "Teaching4Learning@Unipd" program.

The T4L program has shown significant growth over time, with a total of 43 courses delivered by the end of 2022. Additionally, 58 activities were conducted to delve deeper into experiences and teaching approaches. Notably, more than 15% of the faculty, totaling 608 professors, participated in several of the offered courses, while 542 (14.5%) attended workshops. Moreover, 355 faculty members chose to share their experiences following their involvement in T4L (T4L report, Castegini & Antonello, 2023, p.15-18).

The increasing complexity of the T4L program led to the establishment of a specific task force, known as the Monitoring Group, by the University of Padua in 2021. The group's primary responsibility is to investigate the outcomes of the program, utilising existing data points and analysing various sources of information already generated by the university. This approach allows the Monitoring Group to provide insights and updates on the progress of faculty development activities. The group's composition is multidisciplinary, encompassing institutional advisors, researchers, experts in innovative teaching (change agents), and technical administrative staff from the Service Accreditation and Quality of Teaching.

Recently, a report on the impact of six years of the T4L program was published (Castegini, Antonello & T4L Monitoring Group, 2023). Nonetheless, given the complex object of evaluation, further monitoring actions are following, with a focus on the effective implementation of active teaching and learning as perceived by academic staff and students (Raffaghelli, Antonello, de Rossi, 2023).

In this working document, liaising with the ARQUS project, we report an overall survey to understand whether active methods are being adopted within the University of Padua. Therefore the specific UNIPD (participant and non-participant to the T4L programme) teachers' perceptions regarding the implementation of active methods in class are the focus of the current report.

Goals

The main objective of this project was to map the active learning practices of the professors of the University of Padova, who taught Curricular Units in the academic year 2022/2023, in undergraduate and master's courses. In addition to seeking to identify approaches and practices in terms of assessment and teaching activity in the classroom, this study also aimed to collect teachers' perceptions about the factors that promote or inhibit the adoption of pedagogical practices based on active learning.

This report is based on a survey study, aimed to gather complementary, self-reported information. The main research question was: *To which extent the Active Learning Practices (as an active component of the faculty development programme) are perceived and integrated into practice?*

Method

Teachers were asked to indicate, on a scale ranging from Never to Always, their frequency of use of *active learning practices* (ALP). ALP refers to instructional approaches that actively engage students in the learning process, rather than having them passively receive information. These practices aim to make learning more interactive, meaningful, and student-centered. Instructors who use active teaching methods design their lessons to be hands-on and interactive, encouraging students to take responsibility for their learning. The students get actively engaged in building their own understanding. This contrasts with passive learning, where students simply receive information. In ALP, students might work on problems, participate in discussions, or engage in hands-on activities (Fedeli et al., 2020; García-Peñalvo et al., 2022). Therefore, teachers were asked about the frequency of use of specific approaches to active learning practices in the taught course (Figure 2). These approaches were divided into 4 categories of possible methods, well documented in the literature and resulting also from the information and training offered at the T4L (Fedeli et al., 2020). The categories we identified in the literature to organise the several methods were hence: interactive-collaborative methods, simulative/explorative methods, use of technology, and formative evaluation and assessment methods. Also, methods that overlapped (e.g., learning with problems or problem-based learning; or teamwork and collaborative workgroup) were merged. The specific methods depending on the four categories above are detailed along with the results presentation, to facilitate the readers' interpretation of data.

After considering the teachers' perceptions on their teaching methods application, we considered elements influencing or modulating the implementation of ALP, in agreement with the methodological approach pursued by other ARQUS partners. Specifically, we explored the factors hindering ALP' integration. The questions in this section yielded complex results; these could become part of further analysis about teachers' considerations on their experiences in class, in specific contexts of practice. Such factors could be linked to elements that are not fully connected to training or professional learning on ALP and their implementation, but are part of organisational cultures or policies in place in the context influencing faculty development.

Data collection and Analysis

Data was collected through the usage of LimeSurvey. The link was shared with all the teachers at the University of Padova. The survey was delivered by the end of the second semester, ensuring that the students had recently finished their open for a month. The survey adopted self-reported measures, namely, teachers' perceptions on the transfer of achieved knowledge to their practice. The original database recording all answers to the questionnaire includes 593 observations. Many of them have incomplete information, therefore we retained only those observations that had complete information, meaning that all pages of the questionnaire were filled out. As a result, we got 241 remaining observations. Although there is still some missing information where teachers did not respond to specific questions, this is a minor concern when we consider those who got to the final page of the questionnaire.

Participants

Out of the 241 teachers, 108 were female, 124 were male, and 9 "others". There were 30 type B researchers and 30 type A researchers; 113 associate professors and 52 full professors; finally, 4 adjunct professors, 12 "others". Regarding age, the most significant group consisted of 73 teachers older than 55 years old, accounting for 30% of the sample. The second-largest group was composed of 45 participants aged 51-55 years old, representing 19% of the sample. Additionally, there were 37 participants (15%) aged 36-40, 34 (14%) aged 41-45, 32 (13%) aged 41-45, 14 (6%) aged 31-35, and only 6 (2%) aged 26-30. It was important to note here that almost half of the participants (49%) were above the age of 51 years old.

Accordingly, the level of experience among the professors in the final database was expected to be substantial. The distribution of years of experience was as follows: 86 (36%) had more than 20 years of teaching experience, 56 (23%) had 10-20 years of experience, 59 (24%) had 5-10 years of experience, and 40 respondents had less than 5 years of teaching experience. Notably, more than half of the teachers (59%) had accumulated more than 10 years of teaching experience.

Respondents were also asked to provide information about the course in which the transfer of knowledge was potentially observed, and they were requested to select a course in which they were aware of having implemented relevant teaching innovations.

The respective disciplinary field was assigned to each course. In the Italian context, the Ministry of Education, University and Research (Ministero dell'Istruzione, dell'Università e della Ricerca, MIUR) has defined 14 areas of academic activity (research and teaching). These areas are widely adopted to analyse and address organisational processes (such as career development, working groups, and agendas) and policies at both institutional and national levels. They are:

- A1 Mathematical and Computer Sciences
- A2 Physical Sciences
- A3 Chemical Sciences
- A4 Earth Sciences
- A5 Biological Sciences
- A6 Medical Sciences
- A7 Agricultural and Veterinary Sciences
- A8 Civil Engineering and Architecture
- A9 Industrial and Information Engineering
- A10 Sciences of Antiquity, Philological-Literary and Historical-Artistic
- A11 Historical, Philosophical, Pedagogical, and Psychological Sciences
- A12 Legal Sciences
- A13 Economic and Statistical Sciences
- A14 Political and Social Sciences

Regarding the disciplinary fields represented in our study, we observed that all the 14 MIUR disciplinary areas were covered, though with variable levels of participation. The highest level of participation was obtained by A11 (60 respondents, 18%), A9 (55, 16%), and A13 (39, 12%). Other groups achieved participation figures between 30 and 20 respondents (A7 and A6, 28, 8%; A10, 26, 8%; A1, 20, 6%). A bunch of fields achieved 16-14 responses (5-4%; A2, A5, A3, A12). A8, A14, and A4 were the least represented, with 8 to 4 responses, accounting for 2-1% of cases.

Active Learning Training

As for the Active Learning Training, 113 out of 241 teachers in our dataset had attended at least one of the initiatives of the Teaching4Learning project: 56 had participated in the T4L base level course, 35 in the advanced level, and 22 to other (low exposure in terms of time, advanced in terms of topics) initiatives, such as workshops. It was noticed that 64 out of 108 female teachers (59%) were treated, while only 47 out of 124 male teachers (38%) were treated.

Overall Results

At first, the responses were aggregated in order to draw a global picture of the use of these practices. As can be seen in Figure 1, only 4% of the participants implement ALP in their classes all the time. More than half of them, however, rarely (27%) or never (35%) use ALP in their classes.
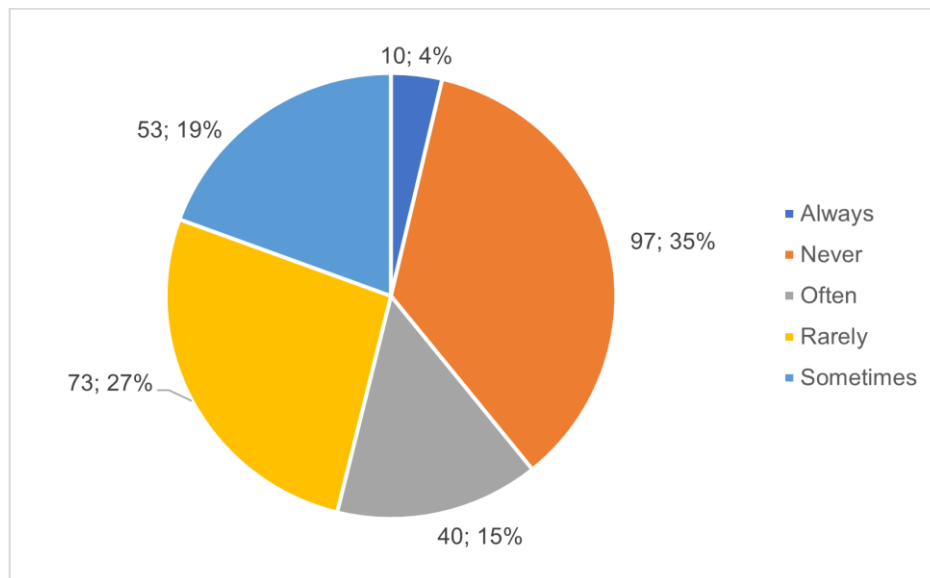

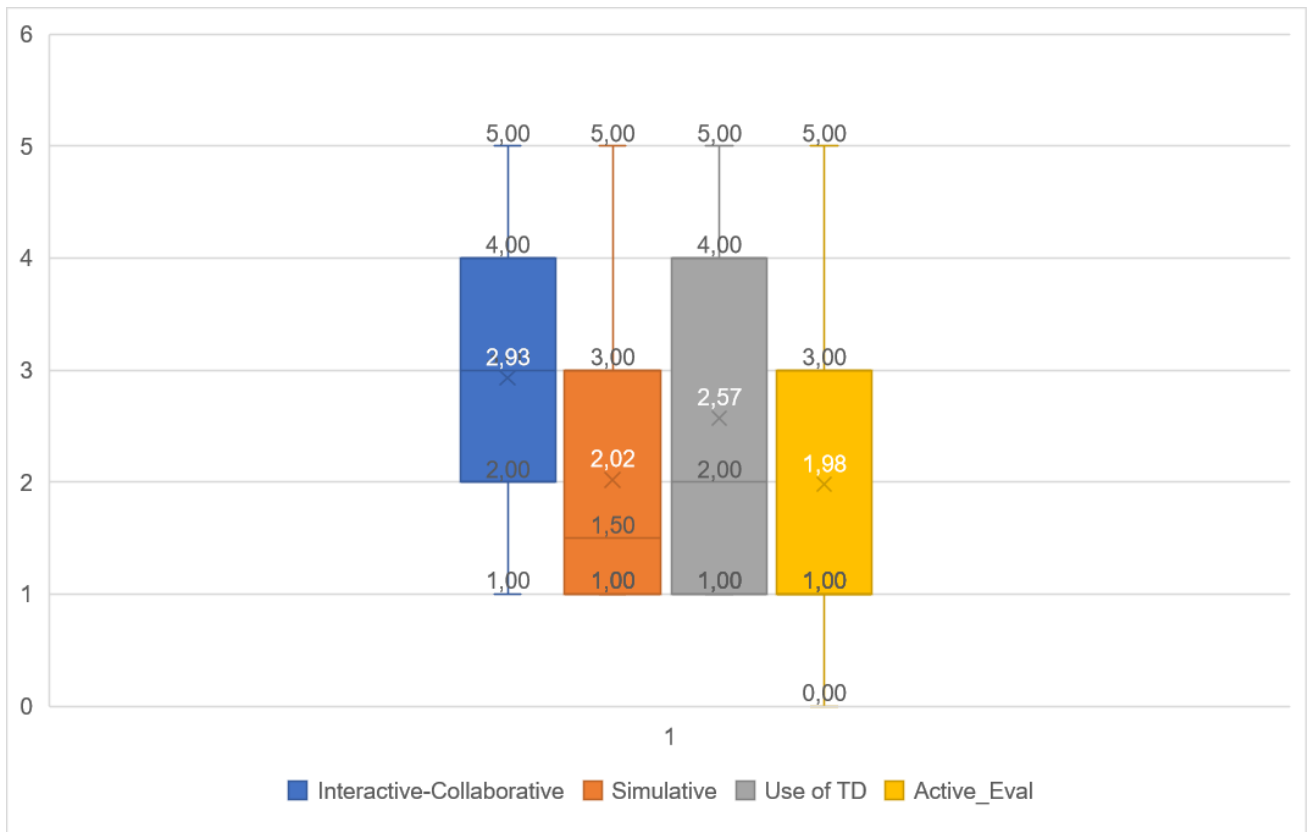*Figure 1 - Total of "Active Learning Practices"*

Figure 2 - Specific Approaches to Active Learning

The figure 2 displays the distributions of frequency for the specific ALp overall category (1, ALP never implemented 5, ALP always implemented). We observe that the IC methods (interactive-collaborative) are probably the most frequently implemented (Mean=2,92; Max=4, Min=2). This category is followed, though with higher dispersion, by ET usage (educational technology: Mean= 2,56; Max=4, Min=1). The lowest values relate to SI (Simulative Methods) and active evaluation approaches (respectively, Mean= 2,02; Max=3, Min=1; and Mean= 1,98; Max=3, Min=1). If we consider the use of technology-based active learning approaches as a cross-methods factor, we can observe nonetheless that the level of usage is low. Figure 3 shows that 21% of the participants always use technology to support their teachings, while 50% of them rarely (16%) or never (34%) use it.
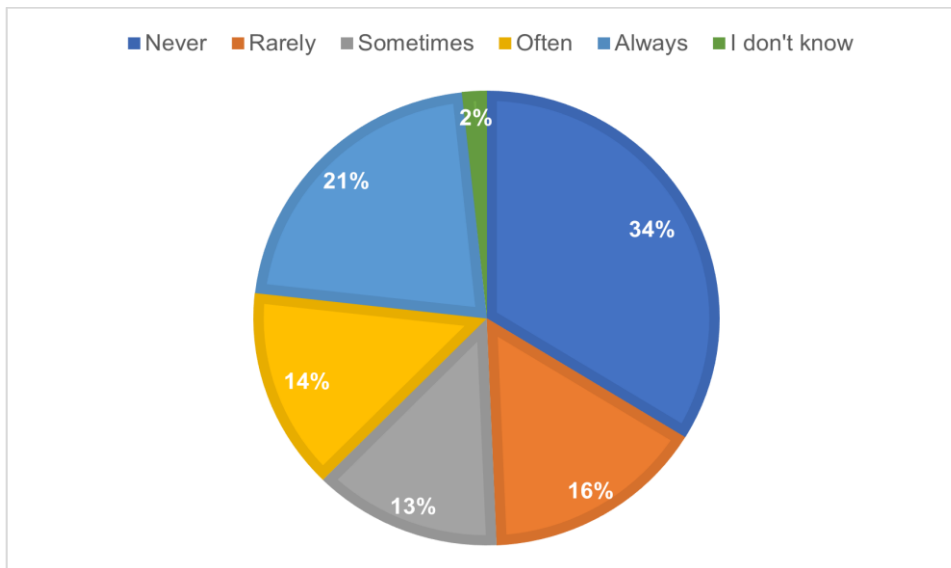
Figure 3 - "Use of Technology - frequency of use"

In the following, we will provide insights for each specific Category of Methods, explaining the specific methods considered within.

Methods for interaction and collaboration

We started from measuring the frequency of use of the *methods for interaction and collaboration*. Among these methods, we chose the following ones:

- **Group work.** Collaboration between students to discuss documents, hand in assignments, develop projects, and solve problems;

- **Interactive Presentations.** Use by the teacher of expository techniques to make his or her explanation clearer (concept maps, diagrams, guided examples...);

- **Monitoring learning.** Immediate verification with targeted questions related to the understanding of the concepts just explained;

- **Peer feedback.** Opportunity to exchange considerations/reflections/comments on tasks performed by one or more companion(s);

- **Debate.** Comparison/discussion between students divided into teams on topics proposed by the teacher.

The differences between methods' frequency of adoption (Figure 4) demonstrate that the most used methods are Group Work, Interactive Presentations, and Monitoring Learning. It is relevant to point out that while Interactive Presentations figure as the most used method, it is also the more traditional approach to promote

interaction (for example, asking questions to the students during the lesson, or dialogic lesson) (Ranieri et al., 2018).
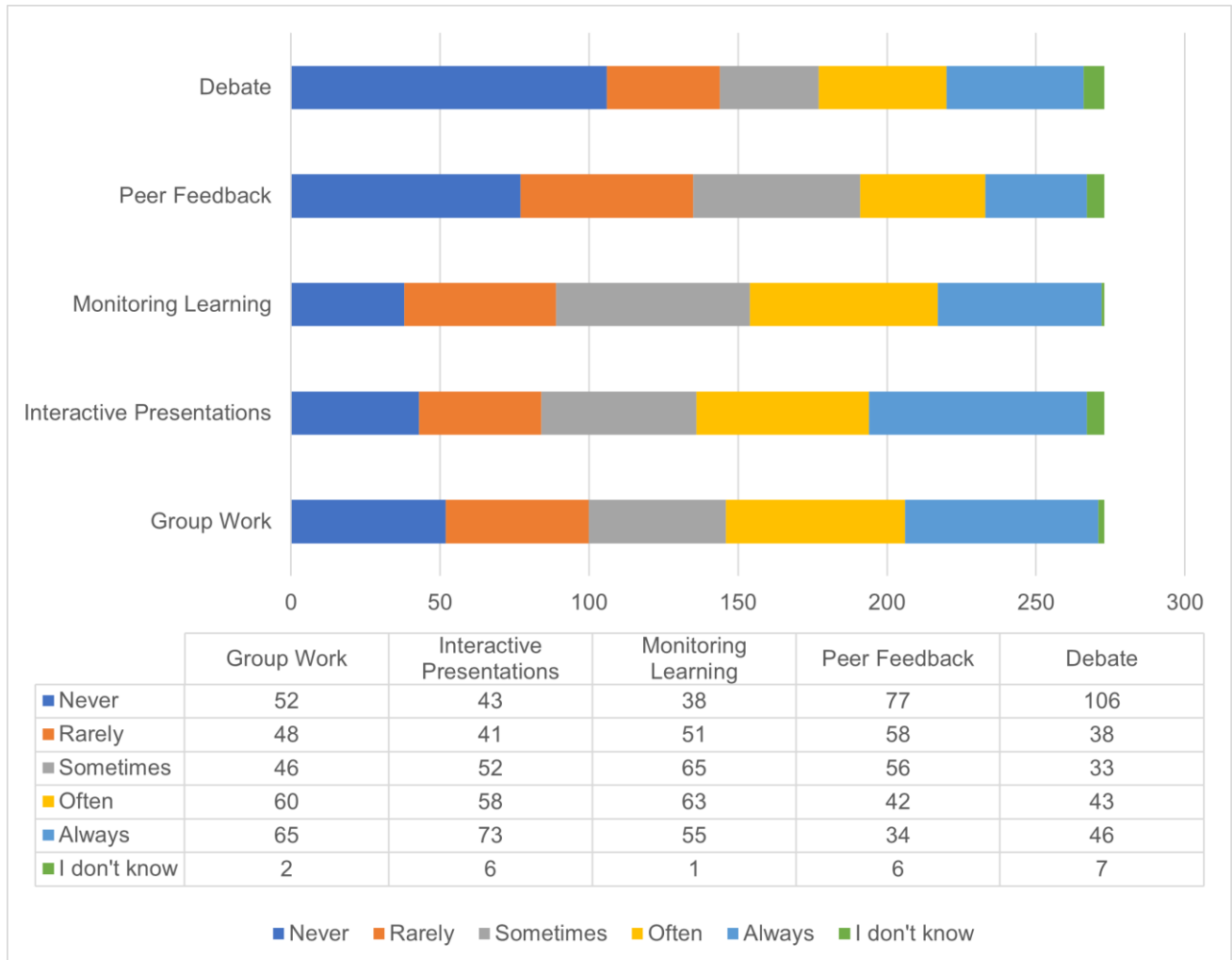

	Group Work	Interactive Presentations	Monitoring Learning	Peer Feedback	Debate
■ Never	52	43	38	77	106
■ Rarely	48	41	51	58	38
■ Sometimes	46	52	65	56	33
■ Often	60	58	63	42	43
■ Always	65	73	55	34	46
■ I don't know	2	6	1	6	7

Figure 4 – Methods for interaction and collaboration – frequency of use

Simulative/explorative methods

We noticed that there were few responses about the *simulative/explorative methods.* We took into consideration:

- **Problem Solving.** Didactic strategy organised in phases through which a problem is proposed to be solved in groups or individually (problem launch; analysis of present/missing data; information search; solution hypothesis; discussion);
- **Case Study.** Individual or collaborative activity based on real/simulated cases through which one is called upon to put acquired knowledge and skills into play;
- **Simulations.** Activities in which concrete situations are simulated with which to interact;

- **Role Playing.** Role play for educational purposes in which one group of students interprets a situation/case and another group observes;

- **Project-based learning.** Individual or group activity in which students/students develop a project according to shared coordinates (planning, decision-making, in-depth analysis);

- **Problem-based learning.** Activity inherent to a thematic module or teaching, in which the various learning phases of the class are designed around the analysis and solution of real or simulated problems;

- **Flipped classroom.** Activities in which content selected by the teacher(s) is proposed to students for independent study and consultation, and then discussed in class, revised, and deepened in an active, collaborative, reflective manner;

- **Gamification.** Activity in which the teacher proposes learning through sequences of individual or team games with cumulative rewards, motivational strategies, and competitions.

As can be seen in Figure 5, Case Studies are the most used, while Role Playing and Gamification were used very little. Gamification entails several techniques to engage the students, like competitions, awards, levels of difficulty, etc. which are frequently supported by the adoption of technologies. They represent a challenging approach to supporting learners' engagement and participation (Kapp, 2012) and their potential is not fully developed in higher education.
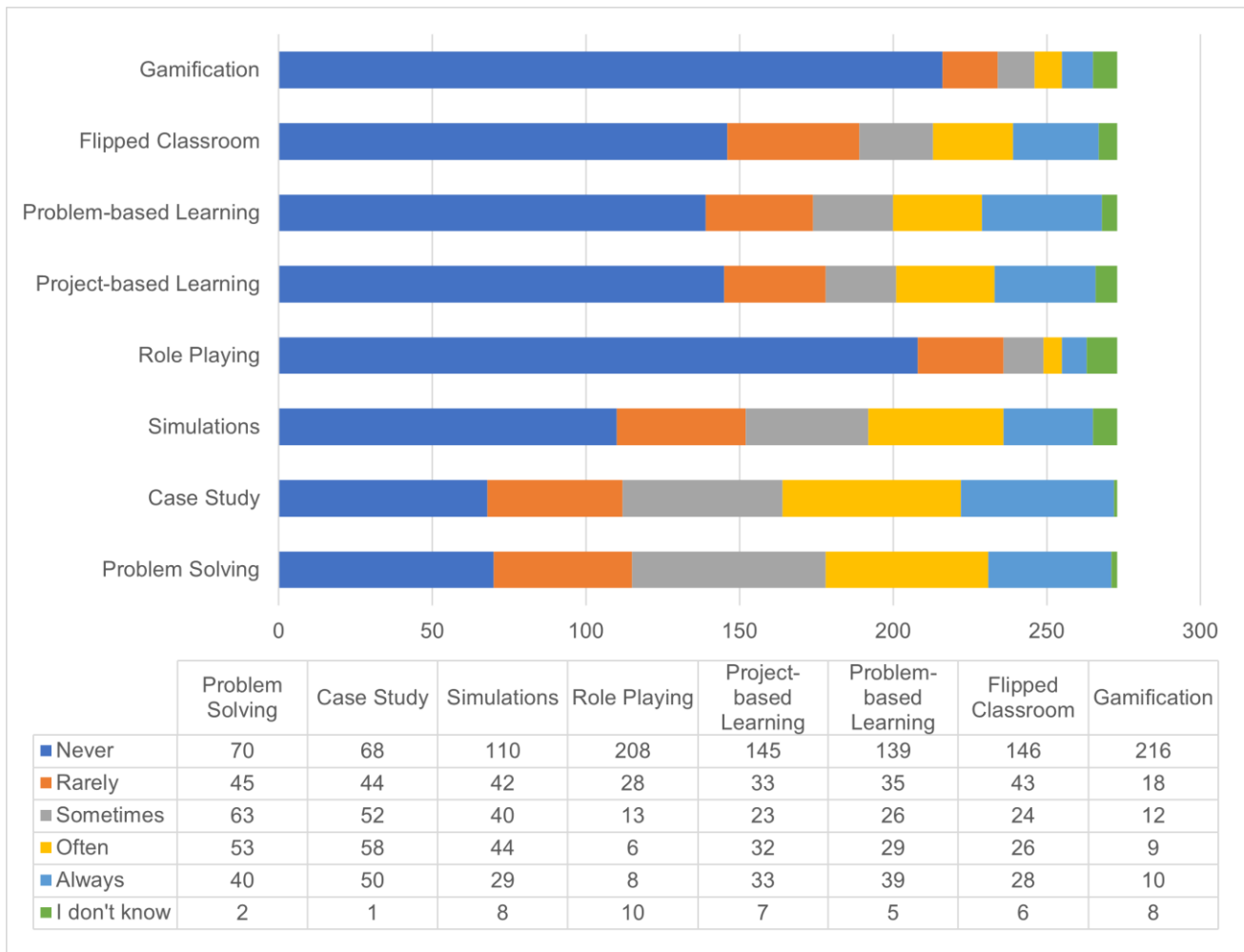
	Problem Solving	Case Study	Simulations	Role Playing	Project-based Learning	Problem-based Learning	Flipped Classroom	Gamification
■ Never	70	68	110	208	145	139	146	216
■ Rarely	45	44	42	28	33	35	43	18
■ Sometimes	63	52	40	13	23	26	24	12
■ Often	53	58	44	6	32	29	26	9
■ Always	40	50	29	8	33	39	28	10
■ I don't know	2	1	8	10	7	5	6	8

Figure 5 – Simulative Methods- frequency of use

Technologies for teaching

As for the *technologies for teaching*, we analysed:

Information Search. For searching information, digital content, and data (websites, databases, digital platforms, open access resources, ….);

Content Sharing. To share information/materials (MOOCs, Kaltura Capture, Media Space, Moodle, Google Drive, Padlet, Youtube...);

Communication and Collaboration. To promote discussion and collaboration between students/students (forums, chats, blogs, shared comments on videos and/or texts);

Content Creation. To create digital content (videos, podcasts, tasks, presentations, digital storytelling, ...);

Interaction. To interact and respond in class (Wooclap, Mentimeter, Kahoot,....);

Supporting Teaching Strategies. To support teaching strategies (maps, diagrams, guided examples, interactive videos, ...);

Problem Solving. To solve problems, analyse cases, develop projects (self-guided exercises, tutorials, simulated workshops)

Figure 6 shows that only the most traditional approaches to technology usage, i.e., Information Search and Information/Content Sharing through assignments, displayed a high frequency of adoption. Frequencies of the other five approaches indicated low usage of technologies for communicating, creating, interacting, supporting teaching, and problem-solving. It must be highlighted that interactive technologies like students' response systems can become quite a traditional approach if they are not appropriately designed. If implemented as part of a canonical lesson, they mostly address Q&A sessions from the teacher to the students, entailing no further reflection but just the correct/wrong responses (Bozzi et al., 2021; Ludvigsen et al., 2020; Nielsen et al., 2013).

	Information Search	Content Sharing	Communication and collaboration	Content Creation	Interaction	Supporting Teaching Strategies	Problem Solving
■ Never	32	21	97	138	130	105	120
■ Rarely	37	16	59	32	40	68	44
■ Sometimes	54	25	38	26	28	38	40
■ Often	60	54	32	34	32	31	31
■ Always	85	154	43	36	37	24	31
■ I don't know	4	2	3	6	5	6	6

■ Never ■ Rarely ■ Sometimes ■ Often ■ Always ■ I don't know

Figure 6 - Use of Technology - frequency of use.

Evaluation strategies

Among the *formative evaluation and assessment strategies* analysed there were:

- **Peer Evaluation.** Activities where the students provide feedback on a learning product or process;
- **Self-evaluation.** Activities where the students self-explore and assess a learning product or process produced by themselves;
- **Digital and Automated Evaluation.** Quizzes, Multiple-choice tests, also via automated feedback (e.g. Moodle quizzes);
- **Automated eOpen-ended tests.** Including through automated feedback;
- **Constant Monitoring.** Continuing/Formative Evaluation of tasks, including those carried out collaboratively.

All strategies were little used by participants (Figure 7). The relevant usage of technology-enhanced self-assessment can be connected to quizzes' usage to understand and recall relevant content. Many teachers adopt this as a sort of training for the final examination, using the same or different questions. This practice does not change the foundations of traditional approaches to the evaluation of learning (Sancho-Gil et al., 2020), though it expands the teachers' and learners' ability to follow the progress of learning. The focus is always connected to memorising content. More transformative approaches will focus on formative assessment or the production of a portfolio displaying the learners' creativity (Serbati et al., 2019), and are connected to "constant monitoring" which is still one of the least adopted approaches.
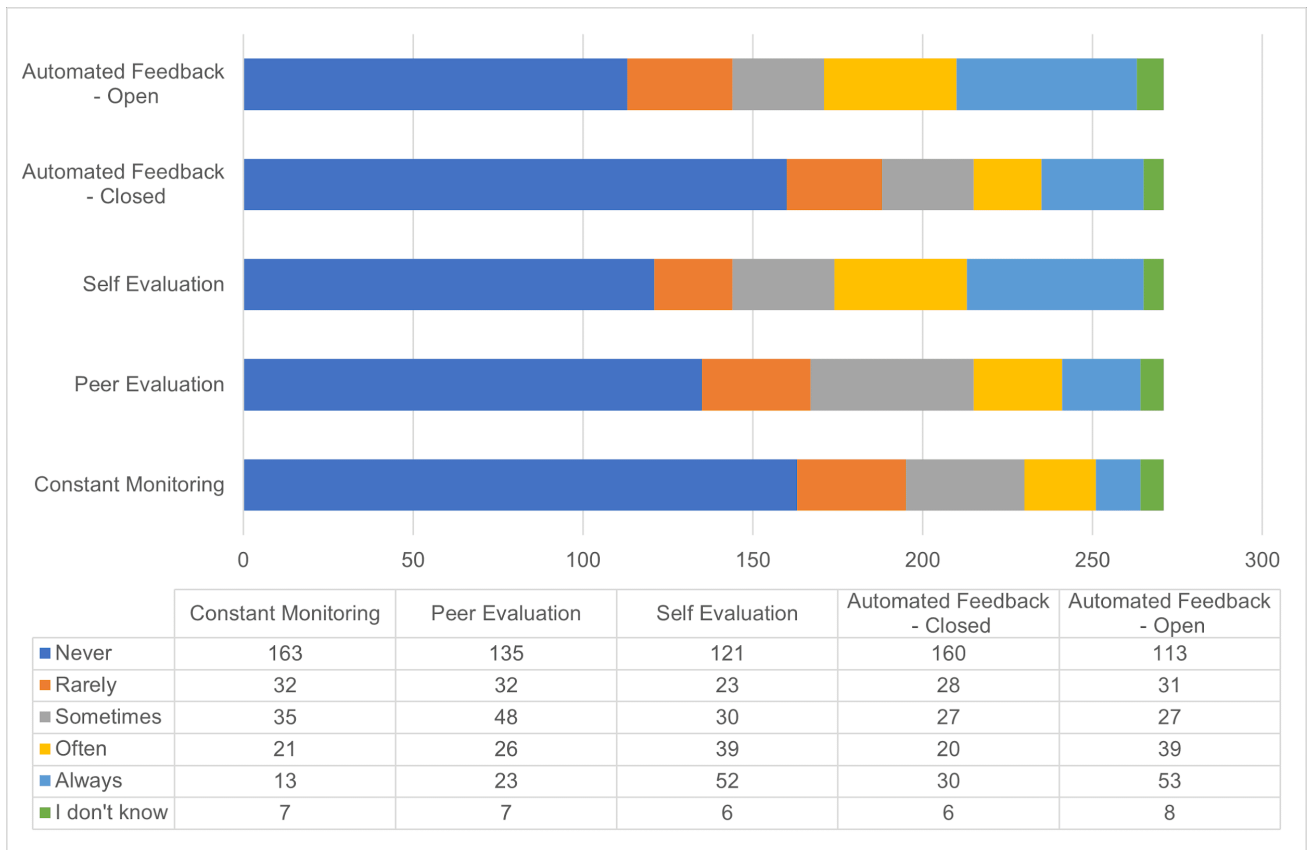
	Constant Monitoring	Peer Evaluation	Self Evaluation	Automated Feedback - Closed	Automated Feedback - Open
■ Never	163	135	121	160	113
■ Rarely	32	32	23	28	31
■ Sometimes	35	48	30	27	27
■ Often	21	26	39	20	39
■ Always	13	23	52	30	53
■ I don't know	7	7	6	6	8

Figure 7 - Formative Evaluation and Assessment - frequency of use

Hindering Aspects

We now delve deeper into the hindering aspects of teaching (Figure 8). Consistently with the findings relating to the prior section in which we describe the still nascent approach to ALP in the UNIPD context, respondents expressed some specific hindering aspects that might prevent them in further engagement, or in being motivated to make efforts to introduce ALPs in class. For example, work overload entailed by the ALP and excessive class sizes block their integration into teaching. It was interesting to observe though that all the respondents considered that "no elements impeding ALP implementations" was unrealistic. They also felt that the lack of recognition for their career advancement within the academic profession was a considerable factor hindering their efforts to implement ALP.
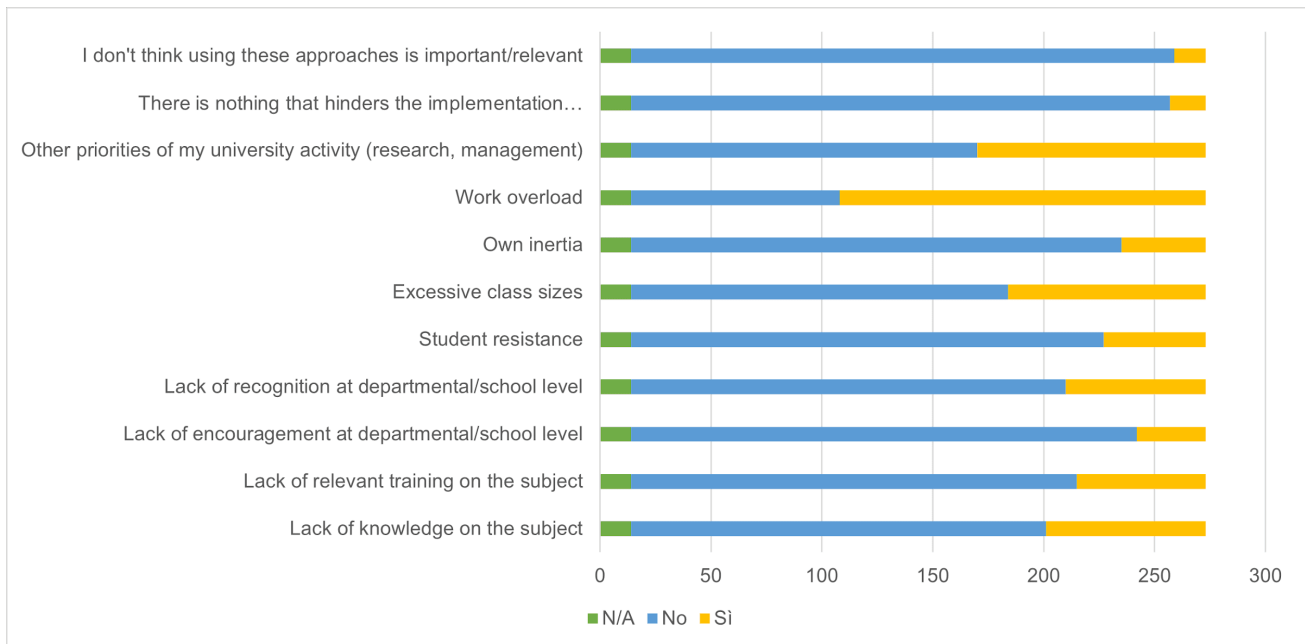
Figure 8 - Factors hindering Active Learning Practices

CONCLUSION

Adequately equipping faculty members with the necessary skills and knowledge to effectively implement methodologies and technologies should enhance educational quality. Therefore, monitoring the extent of faculty development programmes contributes to this essential goal. The present study investigated the perspectives of 241 teachers on the utilisation of active teaching methodologies. This is a small number, but the results emerged sought to understand the complexity of responses relating to the implementation of ALP as a key to transforming teaching and learning. Overall, our findings underscore that teachers are redesigning their teaching, particularly by introducing technologies to support class interactions as well as students' self-assessments. This is already a relevant achievement, even though the transformation into active, learning-centered approaches requires more student autonomy in participating, more problem-solving, and experiences triggering their creativity. Also, collaborative methods are receiving increasing attention and are in a good way, though they encompass huge efforts to be implemented. Simulative methods such as role-playing, content creation through the adoption of technologies, and formative assessment demand further attention. Nonetheless, we must recall that any innovation in teaching requires several cycles of redesign, testing, and implementation. Therefore, the participants might well be at the beginning of a transformative process that could be only observed in the longer term.

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