TECHNOLOGY-MEDIATED ACTIVE LEARNING: CONCEPT, PERSPECTIVES AND CHALLENGES

D. Pappa, C. Makropoulos, V. Pitsilis
NCSR Demokritos (GREECE)

Abstract

Active learning, described as learning through the active participation of students, has received considerable attention in recent decades. The term broadly describes a student centered approach, in which the responsibility for learning is placed upon the student, often working in collaboration with their peers (group assignments, discussions, think pairs, etc). The pedagogical merits of active learning for universities have long been acknowledged, as well as its challenges. Active learning can increase student achievement and create positive relationships among students. Nonetheless, for many educators there remain questions about what active learning is and how it can be effectively implemented. Technology can further enhance the advantages of active learning, providing significant improvements with regards to the structure and nature of teacher-student, student-student and teacher-teacher collaboration within and between universities and enable a variety of formal and informal learning settings, designed to create a variety of cognitive, social, and behavioural impacts on students.

The paper discusses the implementation of technology-mediated active learning in the context of higher education. We identify and discuss the important dimensions of technology-mediated active learning from the perspective of the involved stakeholders.

Keywords: active learning, higher education, technology, collaboration platforms.

1 INTRODUCTION

“Tell me, I’ll forget; Show me, I’ll remember; Involve me, I’ll understand” claims a Chinese proverb. There has long been a debate in the education community around teaching strategies and methods for making learning meaningful. Gleason et al. [1] stress that learning without meaning is often soon forgotten, as meaningful learning results in understanding, while rote learning ends in memorisation. Bonwell & Eison [2] note that to learn, students must do more than just listen. The term active learning has received considerable attention over the past decades. Already in the 1980s, experts were urging academic institutions to shift away from passive lecture-based instruction, to actively involve and engage students in the process of learning [2]. Active learning is essentially about engagement, generally defined as any instructional method that engages students in the learning process [3], asking them to do meaningful learning activities and to think about what they are doing [2]. The term broadly describes a student-centred approach, in which the responsibility for learning is placed upon the student, in the form of reading, writing, discussing, solving problems (inquiry and problem-based learning) and often working in collaboration with their peers (group assignments and team projects, learning communities, discussions, think pairs, etc). Moving away from traditional lecture-based teaching forms, where students are typically passive listeners of information received from the instructor, active learning promotes higher-order thinking tasks, such as analysis, synthesis and evaluation [2].

The pedagogical merits of active learning for universities have long been acknowledged, as well as its challenges. Scholars emphasise the importance of such deep approaches to learning (i.e. methods in which the students’ aim is to understand ideas and seek meaning) compared to surface learning approaches (e.g. [2],[3],[4],[5],[6],[7]). Engaging students and making them active participants rather than passive listeners has been shown to lead to higher learning outcomes [4]. Deep learning approaches encourage a personal, active, critical, internally motivated and positive response to learning [7]. Interaction and active participation allows students to share ideas and apply their knowledge, exposes them to perceptions of their peers, makes learning more enjoyable, and allows the lecturer to test understanding [8]. Raban and Litchfield [9] discuss the benefits of self and peer evaluation, feedback, and review for individual learning. Prosser and Trigwell [6] further claim that university teachers can improve the quality of student learning by determining how students perceive their unique learning situations.
Active learning can effectively promote the mastery and retention of content and the development of student’s skills, can increase student achievement, and create positive relationships among students. Nonetheless, for many educators there remain questions about what active learning is and how it can be effectively implemented, as active learning goes beyond homework assignments and laboratory experiments.

Active student engagement underpins several of today’s popular learning paradigms, for example: informal cooperative learning consists of students working together to achieve a joint learning goal in temporary, ad-hoc groups [10]; flipped classroom reverses the traditional learning environment to deliver instructional content outside of the classroom and employ classroom time for students to work through problems, advance concepts with the guidance of their teacher/mentor, and engage in collaborative learning ([11], [12]); mobile learning teaching strategies allow for ubiquitous learning and often involve active learning (e.g. experiential field activities)[13].

Continuous advances in technology enable new pedagogies of engagement inside and beyond the classroom, enhancing student learning. Advances in computer technology have strengthened an interest in active learning [14]. Technology can further enhance the advantages of active learning, providing new mechanisms to engage and involve students. The classroom of the future is a space, both physically and pedagogically, in flux. Powered by new and ubiquitous technologies, the physical spaces which make up the classroom, the educational technologies used, the teaching pedagogy and the expectations for students, teachers and academic institutions are in constant evolution. A broader and more comprehensive definition of active learning is thus required: technology-mediated active learning (TMAL) is about harnessing technology to support engagement of all stakeholders for meaningful learning.

According to Tapscott & Williams [15], collective intelligence is mass collaboration. TMAL signifies putting in place methods and tools to facilitate massive peer-to-peer collaboration for students and teachers, in an extended ecosystem for collective knowledge creation, building on the principles of Openness, Peering, Sharing and Acting Globally.

The following section discusses the implementation of technology-mediated active learning in the context of higher education. We identify and discuss the important dimensions of technology-mediated active learning from the perspective of the involved stakeholders.

2 TECHNOLOGY-MEDIATED ACTIVE LEARNING IN HIGHER EDUCATION: IMPLEMENTATION AND PERSPECTIVES

While the concept of active learning is not new, its implementation is generally ambiguous, fragmented and non-systematic, and it typically takes place outside formal curricula. Besides its effectiveness as a learning method, a further reason calling for active, collaborative learning methods is that the formal methods traditionally applied by HEIs cannot accommodate the changes in society and the work environment and therefore cannot fully supply students with the skills and attitudes they need to adapt to new forms of working and to become successful professionals. Active learning needs to complement formal education with a learning methodology, services and tools to help students benefit from advanced networking and partnership building and acquire the soft skills needed for their future employability. With digital technologies changing how people learn, we need to re-examine the design of formal education methods looking beyond fixed institutional contexts and practices. TMAL can offer great opportunities to higher education: open and connect university classrooms, promote curiosity, creativity and innovative spirit in university students and innovation and best practice in teachers.

Technology-mediated active learning can inspire and empower students to take active part in their own learning, and to create and explore learning opportunities beyond the boundaries of their university classroom. The affordances of virtual mobility represents a real opportunity to increase cooperation for new practices using innovative teaching methods. It can help reframe higher education within and beyond the classroom, creating an active learning ecosystem, in which everyone is connected. TMAL can facilitate a wide range of learning experiences and settings to support and accommodate both formal and informal learning, taking place inside and beyond the classroom. This can produce significant improvements with regards to the structure and nature of teacher-student (T-S), student-student (S-S) and teacher-teacher (T-T) collaboration within and between universities and enable a variety of formal and informal learning experiences occurring in both formal and non-formal spaces, designed to create a variety of cognitive, social, and behavioural impacts on students.
A new paradigm thus emerges of a connected and active classroom, seen as an extension of the physical classroom, employing the internet, wireless, portable and handheld technologies including laptops, table computers, smartphones and other wireless computing devices to provide active learning experience in more dynamic environments, ranging from formal settings (university classrooms) to more informal social structures. Students can actively engage in learning exchanges with their teachers or with their peers. The teacher should be the one to direct and/or encourage students at all times, nurturing formal and informal learning exchanges and collaborations.

The active learning environment needs to accommodate a teachers’ and students’ community and facilitate reciprocal learning and dialogue. The TMAL environment is envisaged as a socially enhanced digital space to allow teachers and learners to collaboratively and openly create, share and discover active learning project ideas to engage in and peers willing to collaborate with them for their execution in an online or blended environment. Development of a TMAL environment needs to draw from several areas, building on and extending existing approaches and tools, namely from: active participation and co-construction of knowledge, collaborative design and development of educational offerings according to the connectivist model [16] and Vygotsky’s activity theory. In order to be student-centric, collaboration needs to build on the principles of Design Thinking [17]. Having idea-generation [18] as the starting point of the process can lead to the development of active learning offerings that are fit for purpose in real educational settings. The design of the TMAL environment should build on the principles of positive computing [19] and include features to foster user engagement and motivation.

The benefits and challenges of TMAL span the entire stakeholders’ base of higher education: teachers, students, and academic institutions.

2.1 Student perspective

TMAL supports diversity and facilitated adaptability to the real-life needs of students. For students TMAL signifies more attractive, participatory and flexible formal and informal education programmes, aligned with individual needs (flexible learning, individualised learning, collaborative learning, critical thinking development, and virtual mobility). TMAL can strengthen and enhance students’ collaboration with their teachers. Earlier scholarly research has demonstrated the value and potential of this approach. For example, the OEI2 project [20] successfully applied platform-mediated collaboration to manage teacher-student collaboration for thesis development [21]. Significant advantages are expected in the horizontal (student-student) dimension. By leveraging ICT-based virtual mobility methodologies, universities can develop new and/or improve existing practices to bridge local and geographically dispersed students, in order to create active learning communities that improve the effectiveness of learning activities and increase the capacity of students to collaborate, also at international level. The social dimension, including establishing a climate for positive social interactions inside and outside of individual HEIs is particularly important in this context. Students can live rich learning experiences that build on cross-institutional collaboration, with people from different regions and cultures and enrich their intercultural competence, digital and social skills, regardless of geographic location, financial or personal situation. Furthermore, the critical mass created can help deal with potential differences in learning outcomes linked to geographical or socio-economic disparities. Other benefits include increased level of digital competence and sense of initiative.

2.2 Teacher perspective

Academic teachers engaging in TMAL can profit from the development (personal projects or T-T collaboration activities) and implementation of active learning projects (local or virtual mobility-enabled, single student or group T-S collaboration). For teachers, TMAL represents an opportunity to offer interesting classroom experiences to their students ([22], [23], [24], [25]). It also implies a need to increase their capacity and professionalism, to develop their competences in active learning, to gain experience in the use of educational technology in the classroom, to adopt and implement best practice and to collaborate with their students and their peers at a cross-institutional level, in order to jointly develop and/or jointly offer formal courses or informal learning activities.

With educators being rather new to such collaborative practices, online active learning is a challenging task. Teachers need to develop and harness collective knowledge, and explore new ways to incorporate active learning into theirs teachings, in order to be able to define teaching goals and learning objectives and select the method and means to accomplish them. This implies a need to
acquire knowledge and skills in conceptualising, planning and evaluating didactical approaches and methodologies for active learning.

The demands of TMAL on the teaching professions call for a new, broader and more sophisticated set of competences that draws from all six competences areas of the proposed European Digital Competence Framework for Educators (DigCompEdu) [26] namely requires competencies that relate to:

- the professional environment;
- sourcing, creating and sharing digital resources;
- managing and orchestrating the use of digital tools in teaching and learning;
- digital tools and strategies to enhance assessment;
- the use of digital tools to empower learners;
- facilitating learners’ digital competence.

Engaging with other teachers in a TMAL environment can promote the development and exchange of best practice and the forging of collaborations that reinforce expertise. Teachers can gain intercultural awareness through cooperation with teachers and students from different countries, adding a new dimension to their teaching.

2.3 University perspective

TMAL supports and enhances the effectiveness reach and impact of higher education, allowing universities to shape their curricula around the specific needs of their students and deliver education of higher quality and efficacy. For HEIs this also signifies a more modern and dynamic environment of inter-university partnership building and collaboration for the integration of good practices and new methods into daily activities. TMAL promotes the internationalisation of universities, reinforcing cooperation with partners from other countries for the development of joint courses and curricula.

The adoption of TMAL calls for the development of know-how and tools for the structured implementation of technology-mediated active learning within and between universities. This involves:

- Creation of educational scenarios and pedagogical materials for active learning experiences;
- Development of an online space to facilitate active learning within and between universities:
  - An online platform for the creation, mediation and open collaboration on active learning projects;
  - Attractive social/community tools designed to support the practicing of active learning by teachers and students.
- Informing and assisting the stakeholders in the pedagogical use of ICT for active learning.
- Promotion of sustainable collaborations and synergies among involved stakeholders for innovation and growth in the field of active learning.

3 CONCLUSION

Traditional methods for teaching employ a lecture format of instruction in which the majority of students are passively listening to the instructor. Current views of learning and instruction stress the need for the learner to play an active role in constructing knowledge. However, existing active learning approaches take a narrow view on active participation, with online initiatives typically limited to communication fora that complement fixed course syllabi. A broader and more comprehensive approach to active learning is called for: aim of technology-mediated active learning should be to leverage technology to support the engagement and collaboration of all stakeholders for meaningful learning. The resulting innovations span several collaboration dimensions: teacher-teacher (T-T), teacher-student (T-S), student-student (S-S), university-university (U-U).

The emerging active learning collaboration paradigms pose challenges in terms of skills, working methodologies and working environment capabilities:

- **Engagement**: Engage and inspire collaborations
Collaboration: Underpinning active learning is the notion of co-creation and collaboration, where participants exploit collective knowledge and develop synergies with their peers.

Support: Develop the knowledge and skills of teachers and learners, to strengthen their abilities as active learning project designers and collaborators and the awareness and capacities of HEIs to promote the permanent integration of active learning.

Technology-mediated active learning emerges as a new paradigm for learning in higher education that has the potential to increase student achievement, teach important soft skills and create positive relationships among students. TMAL represents a self-sustainable and empowering method, guiding stakeholders to become pro-active, effective and proficient in their teaching and learning within an extended network of potential collaborators. It promotes bottom up innovation that is starting at individual level and develops through strong communities who exchange experiences and best practices.

REFERENCES


