React Creation of a Collaborative Environment in e-classrooms

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Literature Review

# Inclusive Online Collaborative Learning Environments



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# Inclusive Online Collaborative Learning Environments

## Collaborative Learning (pedagogical approaches)

Collaborative learning is a well-accepted pedagogical principle that forms the basis of most learning environments in recent years. Laal & Laal (2012) generally define collaborative learning as "an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product." Collaboration in group settings "suggests a way of dealing with people which respects and highlights individual group members' abilities and contributions. There is a sharing of authority and acceptance of responsibility among group members for the groups' actions." (Laal & Ghodsi, 2012). Learners thereby face social and emotional challenges additional to the specific learning tasks that lead to considerable benefits compared to competitive or individualistic learning approaches. Laal and Ghodsi conclude that collaborative learning benefits learners through "higher achievement and greater productivity, more caring, supportive, and committed relationships; and greater psychological health, social competence, and self esteem."

Wiener (1986) formulated a set of evaluation features for collaborative learning:

> *"1. the nature and quality of the task statement. 2. the social setting of the collaborative activity and the behavior of students during the execution of the task. 3. the teacher's behavior during the execution of the task. 4. the teacher's role in group composition and management. 5. the nature and quality of the reports made by each group. 6. the teacher's performance as synthesizer and as representative of the academic learning community. 7. the relation of the collaborative activity to the design of the course. 8. the teacher's knowledge of and commitment to the rationale of collaborative learning." (Wiener, 1986)*

Theory of collaborative learning is closely related to social constructivism. As Resta and Leferriere (2007) explain, "researchers typically draw upon theoretical frameworks and constructs derived from constructivist epistemology (Piaget) and cognitive science's theoretical perspectives emphasizing that cognition is a social rather than a fixed entity". Constructivist theory places learners themselves in the center of knowledge construction. Emphasis is put on the interaction with peers and internalization of new information by relating it to the learner's personal experience (Zhu & Valcke, 2009).

When collaborative learning is practiced in online environments, the same pedagogical principles apply. Technologies should then support the central social-constructivist features of keeping students "active, constructive, collaborative, intentional, complex, contextual, conversational, and reflective" (Jonassen, 2001, as cited by Zhu and Valcke, 2009). To describe online educational activities with collaborative features, the terms Online Collaborative Learning (OCL) and Computer Supported Collaborative Learning (CSCL) are often used interchangeably. Online Collaborative Learning Environment (OCLE) is then the space where the learning happens. Resta and Leferriere (2007) define CSCL as "situations in

which interactions take place among students using computer networks to enhance the learning environment". They note that CSCL always has a technical and a social dimension and uses technologies that support synchronous or asynchronous communication.

## Role of the instructor

One central issue that is much discussed in the literature is the role of the instructor in online collaborative learning environments. Community of Inquiry (Garrison, Anderson & Archer, 1999) is a concept often related to collaborative learning. It defines the educational experience as an interaction between three central dimensions: social presence, cognitive presence, and teaching presence. Teaching presence, which entails course design and facilitation, has the aim to facilitate cognitive presence and social presence within the learning environment. Orcutt and Dringus (2017) more specifically investigate the practices of establishing teaching presence in online learning environments with the aim to engage students and inspire intellectual curiosity. Their research concludes that "pedagogical approaches must have both social and cognitive dimensions in order to establish an active teaching presence." Establishing an "inclusive and equitable learning environment" is crucial for a productive and intellectual climate (Orcutt & Dringus, 2017). The authors argue that a collaborative and open environment where learners feel comfortable to contribute ideas can best be achieved when teaching responsibilities are shared between learners and instructor, and when common learning goals are established.

The importance of the instructor role for creating collaborative learning environments becomes apparent also in other research. Martin and Bolliger (2018) investigated students' perceptions on engagement strategies and found that learner-to-instructor strategies were valued above learner-to-learner and learner-to-content strategies. The findings suggest that use of multiple student-instructor communication channels can increase student engagement in online courses.

The case of an online Master program between a German and a North American university showed that the quality of group collaboration and students' participation could be increased through 10 instructional strategies (Brindley, Walti & Blaschke, 2009):

1. Facilitate learner readiness for group work and provide scaffolding to build skills
2. Establish a healthy balance between structure (clarity of task) and learner autonomy (flexibility of task)
3. Nurture the establishment of learner relationships and sense of community
4. Monitor group activities actively and closely
5. Make the group task relevant for the learner
6. Choose tasks that are best performed by a group
7. Provide sufficient time

The authors stress the importance of reflective practice for instructors to be aware of the impact their teaching strategies have on their learners' behavior and learning experience within their specific teaching context (ibid.).

# Making e-classrooms collaborative

Although the online environment poses new opportunities and challenges, Resta and Leferriere (2007) argue that much of the knowledge gained from past research on collaborative learning can be transferred to the online environment as the overarching goals, pedagogical strategies and interactions are considered as similar. The authors identify four major motives for the uptake of technology in collaborative learning: the preparation of students for the knowledge society; enhancing of student cognitive performance and deepening understanding; increasing learners' flexibility of collaboration in terms of time and space, and the creation of better opportunities for teachers to track students' engagement and collaborative learning progress (Resta & Leferriere, 2007).

Previous research on online collaborative learning has identified many benefits on learners and educators. Beldarrain (2006) describes the opportunities technologies hold for synchronous and asynchronous collaboration between student and instructors, as well as peer-to-peer collaboration. The author highlights the increased sense of connectedness between learners, and development of stronger learning communities beyond time and space that technologies support. Apart from the general benefits of CL, the use of digital technologies is seen to foster students' understanding and contribution to knowledge construction, enhances their engagement and increases their academic achievement (Kumi-Yeboah et al., 2020). The researchers found that technologies gave students "the opportunities to engage, share, reflect and participate in online collaborative group work to become part of the knowledge building process".

Despite the many benefits that technological tools offer, the translation of existing pedagogical concepts to the online environment poses certain challenges for practitioners. Even when instructors are open to adapt to new educational settings, they might not be able to achieve the intended level of interaction in their online courses because their tested strategies do not show the same results as in the traditional classroom (Su et al. 2005).

Research on the German educational landscape for example revealed substantial barriers to the uptake of e-learning technologies. A lack of adequate devices, poor or lacking wireless networks in the institutions and inadequate IT support were reported (Schmid, Goerts & Behrens, 2017; Büsching & Breiter, 2011). Teacher-related barriers became apparent in the same literature. Many educators and school directors in the study failed to recognize the pedagogical potential of digitalization (Schmid, Goerts & Behrens, 2017). As a result, digital transformation is not a strategic topic and is rarely addressed on systemic level, leaving the initiative rather to individual teachers. Teachers in online MBA courses in the U.S. showed difficulties to adapt their mindsets developed in regular educational environments and preferred to use familiar instructional activities when translating strategies to the online environment (Su et al. 2005). They were hesitant to learn new or more sophisticated technologies.

The Covid-19 pandemic is likely to have a significant impact on more structured development of digital learning solutions in the near future. Preliminary results of a survey among teachers during school closures due to the pandemic suggest that teachers are now more open towards adopting new technologies and put higher priority on further training to improve relevant skills (Dreer et al., 2020).

Based on an extensive literature research, Ali, Uppal and Gulliver (2018) developed the TIPEC framework identifying the barriers for successful implementation of e-learning. The framework identifies a total of 68 barriers that are categorized into four main concepts: 1. Technology ("barriers relating to technology concepts and components within the e-learning system"); 2. Individual (barriers relating directly to the student); 3. Pedagogical ("barriers related to teaching methodology, faculty, supporting staff, and course content"); 4. Enabling conditions (overarching barriers that impact the other three dimensions). The authors point to the fact that new factors might arise over time as the field is changing continuously. However, Ali, Uppal and Gulliver argue that the framework supports practitioners and researchers in putting their activities into context and more easily identify and address current or future issues in e-learning implementation.

## Technological tools in OCLE

Among the diverse tools available for online collaborative learning it can be a challenge for educators to pick the right technologies for their instructional purposes. Although quality tests of educational technology (functionality and usability) are commonly researched, there are still relatively few studies on the effectiveness of these tools when being integrated into the e-classroom (Tarun, 2019).

Specific online collaboration tools and their positive effects in e-learning have been investigated by Kumi-Yeboah et al. (2020). Digital technologies that were considered in the study were video lectures, voice thread, blogs, wikis and Google Hangouts. The researchers also took into account the influence of multimedia presentations and online learning experiences (Powerpoints and Prezi) and the influence of social network tools and online learning. Dringus, Snyder & Terrell (2010) further found that mini audio presentations could, with the right facilitation, enhance students' understanding of course content and their satisfaction in the course. A qualitative study of synchronous and asynchronous communication between students with dyslexia and students without dyslexia in Malaysia analyzed the suitability of different online collaboration tools (Pang & Jen, 2018). The researchers found that "(1) text chat is unsuitable for learning discussion for all learners, (2) forum provides self-paced and organized formal discussion for most learners and (3) video conferencing is suitable for interactive face-to-face, verbal discussion for most learners."

A useful model for the creation of technological tools was developed by Rubens et al. (2005). The authors propose seven pedagogical principles to guide the development of educational software:
1. Designing for flexibility and modularity, 2. Facilitating knowledge building rather than providing a discussion forum, 3. Scaffolding progressive inquiry, 4. The role of tutoring in progressive inquiry, 5. Providing tools for structuring and coordinating activity, 6. Designing tools for process analysis, 7. Providing support for community building.

## Learners' perspective

For the success of online learning environments, learners' satisfaction is an important factor (Brindley, Walti & Blaschke, 2009; Zareie & Navimipour 2015; Ng & Baharom 2018). Satisfaction influences learners' acceptance of e-learning technologies and, ultimately, the effectiveness of the online learning. Online courses with elements of collaborative learning and community building are likely to increase learners' satisfaction in the course (Chatterjee & Correia, 2020).

Zareie and Navimipour (2015) who studied employee's satisfaction with e-learning systems developed a framework for assessing the impact of e-learning on employee's satisfaction. The main factors were found to be (1) the educational technology dimension, (2) educational content, (3) attitude of the learner, and (4) motivation. A similar approach was taken by Ng and Baharom (2018). The researchers analyzed the predictors of adult learner's satisfaction in an online learning environment in the context of an online course for educators. Their findings differ from Zareie and Navimipour's framework. The seven identified predictors are: (1) Learning content, (2) Knowledge acquisition, (3) Instruction, (4) Learning platform, (5) Course design, (6) Ability to transfer, (7) Instructor presence and social support. Both studies included only one online course respectively. The authors recommend taking into account other groups of adult learners in future research as their learning needs and outcomes might be different. Practitioners should therefore take into account adult learners' diverse and distinct characteristics when facilitating online learning (Sharp and Whaley, 2018). In the learning environment, special focus should be put on usefulness of the digital tools and ease of use by the learners to ensure a positive experience.

While the previous studies put focus on the online dimension of OCLE, other authors emphasize the collaborative aspects of online learning. Capdeferro and Romero (2012) approached students' learning experiences from a different direction by studying sources of frustration in online collaborative learning rather than student satisfaction. The frustrations found among the participants of this study were: Imbalance in the level of commitment, responsibility and effort (57.5%), unshared goals and difficulties in organization (22.5%), difficulties in communication/dialogue in terms of frequency (20%), problems with negotiation skills (17.5%), imbalance in quality of individual contributions (15%), excess of time spent and workload (15%), conflict and problems in reaching consensus (15%), imbalance between individual expected mark and group mark (10%), misunderstandings (5%), and lack of instructor's support/orientation (5%).

Lai (2011) also draws attention to the importance of group composition in collaborative learning as they have considerable impact on interaction between learners and will influence the learning experience and results. Factors in group composition can be gender, range of ability levels and students' status characteristics. A better understanding of common learners' frustrations with collaborative learning and with group dynamics can help educators improve students' learning experiences and ensure effective collaborative processes.

## Cultural sensitivity

The increasing availability of online courses has made it easier for learners to participate in educational opportunities independent of time and location. Numerous technologies also facilitate international collaboration between educational institutions through online environments. Such developments lead to the diversification of groups in online learning environments, making it an urgent issue for practitioners to understand and to address their learners' particular needs. Many authors particularly analyze the influence of cultural factors on online collaborative learning processes as there is an increasing demand for culturally sensitive course design.

Zhu and Valcke (2009) discuss the influence of students' previous education experiences and cultural factors in online learning environments. They argue that different perspectives on competition, on

student-teacher relationships and on learning methods influence the collaborative experience in intercultural environments. Strong notions of individual competition can hinder collaborative learning processes. Faitmah, Rajiani and Abbas (2021) further note that students from collectivist cultures have a higher tendency to participate in collaborative learning than students from individualist cultures. Students' cultural believes also influence their understanding of a "good" teacher and their expectations of the teacher's role and level of guidance (Zhu & Valcke, 2009). Finally, while students from Western educational perspectives are accustomed to exploratory learning methods, learners from collectivist perspectives rather have expectations of more structured instructional approaches and "being taught" directly by the teacher (ibid.). Guidance structures in e-learning environments should take these factors into account and provide methods that are suitable for the learners respecting their cultural and educational backgrounds.

Differences between students from individualist and from collectivist cultural orientations were also found by Popov et al. (2014) in their analysis of learners' perceptions of collaborative learning, their learning outcomes, and their reported learning experiences. A common issue was the communication and understanding between the groups. Students of both cultural orientations reported to miss non-verbal, visual and social context cues in online learning environments which made it more difficult to interpret each other's messages and confirm that messages were understood as intended (ibid.). To facilitate good communication and collaboration among learners of diverse cultures it is important to provide suitable tools adapted to the students' cultural and social characteristics. Economides proposes a model to identify a student's cultural profile as a basis to select appropriate communication modes. He suggests the adaptation of "communication and collaboration attributes that would be tailored to the individual learner's cultural profile" (Economides, 2008). Such tools should for example encourage rather quiet students to participate and restrict more talkative learners; they could take into account need for leadership and guidance, and different perspectives on time and deadlines.

Next to communication and collaboration tools, a number of other issues have to be considered when designing culturally sensitive course design. Experiences with online courses provided by the Inter-American Development Bank have shown the importance of practical considerations, such as: administration and management issues (timeframe and availability of learners, course fees, student commitment, requirements for online certificates); instructional design (teaching language, interpretations of course content, adaptations of content to learners' personal/cultural circumstances); pedagogy (e.g. common forms of implementation, academic requirements) (Porto, Suarez & Campos, 2018).

## Inclusive learning design

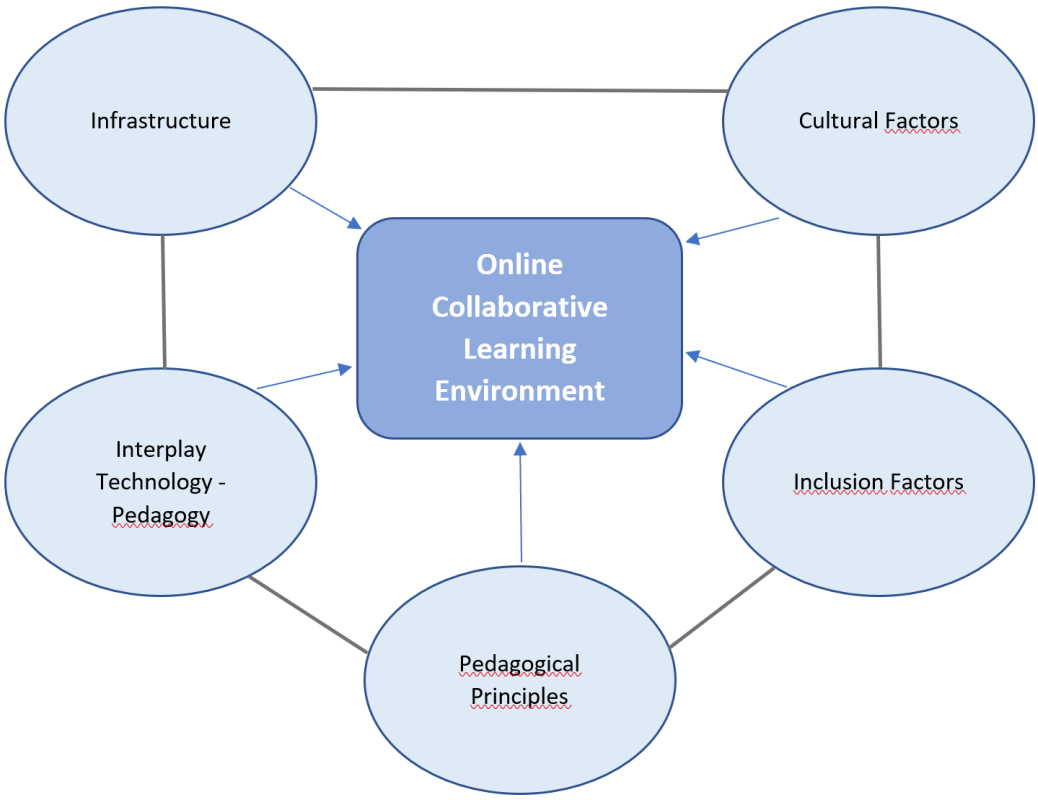
While there is much literature available on cultural factors in e-learning, there are more factors to the creation of inclusive learning environments. A less researched topic is the inclusiveness of OCLE towards students with specific learning needs and different abilities. Even if there is awareness of the need for more inclusiveness, practitioners often lack the knowledge of how to develop accessible learning materials. Online learning environments show insufficient consideration of visually and hearing-impaired persons (McGinty, 2020). This is often due to instructors' lack of understanding of how people with disabilities might use the learning materials and to incompatibility of texts or audio-visual materials with screen readers or voice-to-text technologies.

Lowenthal et al. (2020) add to this that professionals (instructors, designers, managers and administrators) should also take into account the needs of learners with invisible disabilities such as dyslexia, a learning disability or posttraumatic stress disorder, attention deficit hyperactivity disorder, speech or language, emotional and behavioral disorders or autism. These disabilities are much more frequent than for instance blindness or deafness but are rarely reported by the learners. The authors argue that online educators need to pay special attention to three areas and make suggestions on how to address them: accessible and usable courses and content; accessible and inclusive pedagogy and course design; accessible and inclusive teaching (Lowenthal et al. 2020). The different needs of the learners should be taken into account in all three areas when designing, planning and implementing online courses.

## Conclusion

In the presented literature, numerous models on pedagogical strategies, online learning design and barriers to learning have been identified. Although these approaches make important contributions in describing different aspects related to OCLE, there are still persisting challenges in creating truly inclusive and collaborative online learning environments.

We therefore propose a comprehensive model on online collaborative learning environments that holistically takes into account infrastructural factors, pedagogical principles, the interplay between technology and pedagogical principles, cultural differences and inclusion aspects.



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