Collaborative Teaching-Learning in Classroom Research Based Setting and Its Impact

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Abstract

Education has evolved through the refinement of effective teaching methods, and technology has been vital. It enables teachers to use interactive whiteboards, virtual classrooms, and online learning platforms. Education has also become more personalized, allowing students to learn at their convenience and work on their metacognitive abilities. The shift towards collaborative teaching and learning techniques has been pioneered in the last few years, gaining considerable attention and being at the forefront of research. Its rapid adoption is due to its transformative potential that turns the learning environment into an interactive learning space; it implies inclusivity, participation and, most importantly, deep learning, and improving retention ability. This paradigm helps to identify and fill the gap between the real and virtual worlds, allowing learners rapid access to knowledge from any part of the world and leveraging the power of technology to firstly, make learning more engaging and effective and, secondly, foster creativity that is necessary for developing critical thinking and problem-solving skills. Technology has become the vehicle for course delivery and a place where everyone involved can meet.

Keywords: Collaborative Learning, Pedagogy, Peer Interaction, Research, Classroom

Introduction

The collaborative teaching process involves two or more educators planning, organizing, instructing, and assessing a group of students collectively. The aim is to meet the diverse learning needs of students within one classroom, share perspectives and subject-matter expertise, combine appropriate teaching styles, and create an environment that fosters learning and diversity. Sharing responsibility reduces the burden on an individual and escalates each teacher's strengths so that the curriculum is covered more comprehensively and identifies learners' needs. Collaborative learning is how learners work together to solve problems, complete tasks, or understand new concepts. Collaborative learning encourages students to share ideas and think critically, building essential skills such as communication, problem-solving, and teamwork. Students construct and become part of knowledge creation instead of assuming the role of passive listeners.

However, there are some challenges when shifting to collaborative teaching and learning methods, i.e., a transformation is required at the individual, interpersonal, and institutional levels. Firstly, teachers must transition from a "sage on the stage" model to a "guide on the side" approach, and secondly, they must learn to share authority and responsibility and develop new skills to manage, facilitate, and assess collaborative activities. Similarly, students must adapt to an active learning role, honing their abilities to work effectively in teams, communicate their ideas, and negotiate interpersonal conflicts (Palloff & Pratt, 2005). Institutions must adopt this new approach, providing the necessary resources to help upskill teachers and students and invest in the expansion and development of infrastructure to facilitate collaborative teaching-learning.

Despite these challenges, the benefits of these collaborative techniques – role-playing, simulations, case studies, questioning techniques for collaborative discussions, small group projects, jigsaw activities, blogs, virtual teams, learning cycles, web quests, and debates – had a long-term impact on learners. Collaborative teaching-learning has significantly improved student achievement, engagement, and satisfaction. Additionally, collaborative approaches can help reduce stress (for students and faculty) and financial burdens on students by allowing them to share resources and materials. Such collaborative practices result in learning environments that are more inclusive, responsive, and effective.

In addition to academics, collaborative teaching and learning have a wide range of benefits and impacts (research and teaching), which are discussed in sections II, VI, and VII (Aldieri et al., 2017; Gillies et al., 2008; Laal & Ghodsi, 2012; Lubbe & Politis, 2023). It prepares students for the 21st-century workplace, where collaboration, communication, and problem-solving skills are highly valued. It cultivates community values and positive interdependence. Finally, it allows students to build social networks with their peers, which can be indispensable to thrive in this world of globalization. There is even potential to become a game changer, replacing the traditional hierarchy system to foster a culture of sharing, learning, and innovation.

The Benefits of Collaborative Learning

According to T. Pantiz (Panitz, 1999), D.W Johnson and R.T Johnson (Johnson & Johnson, 2009), the benefits of collaborative learning can be classified into three categories:

A. Social benefits
- Establishing a social support system for learners
- Diverse understanding among learners
- Develop a positive atmosphere for practicing cooperation
- Promoting learning and social belonging

B. Psychological benefits
- Augment learners' self-esteem
- Reduces anxiety
- Fosters positive attitudes towards teachers

C. Academic benefits
- Develops critical thinking skills
- Engages learners actively
- Improves classroom results and learning outcomes
- Reflects relevant problem-solving techniques by students
- Personalizes voluminous lectures
- Motivates learners in higher education institutes

The Benefits of Collaborative Teaching-Learning to Teachers

Collaborative student learning helps teachers analyze student work to improve instructional decisions and understanding. From the research perspective, teachers can conduct comparative research, get acquainted with the higher education system and policy-making, advance multidisciplinary research that facilitates the development of theoretical approaches and methods, distribute the responsibility of performing tasks, learning from, and helping each other, and broadening horizons of knowledge (Langer et al., 2003). Over an extended period, teachers discover how students construct the meaning of key concepts and skills. With the insights and skills gained through a collaborative teaching-learning system, teachers become more steadfast about selecting instructional and curriculum approaches, moving students towards appropriate learning outcomes.

The benefits of collaborative teaching-learning to teachers are:
- Commitment to and confidence in promoting student learning
- Analytical and reflective inquiry skills
- Professional knowledge
- Alignment among standards, instruction, and assessments
- Collaborative sharing of expertise
- Awareness and self-assessment

Classroom Seating Arrangements That Encourage Collaborative Teaching Learning Experience

Creating an appropriate classroom setting bolsters collaborative teaching and learning sessions. So, classroom seating arrangements such as roundtables, horseshoes, groups, or pairs can be effective techniques to encourage a collaborative teaching-learning process in a classroom setting (Figure 1). Teachers can plan and pre-work on the appropriate classroom seating arrangements conducive to active, student-driven learning processes. Traditional classroom seating involving rows of rigid "rows seating" arrangements should be avoided, as

communication between students is impossible. Furthermore, students in the first few rows or the middle are more actively engaged with teachers than students seated in the back rows.
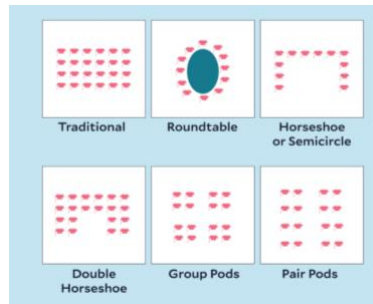

Fig.1. Classroom seating arrangements that encourage collaborative
teaching learning experience
https://poorvucenter.yale.edu/ClassroomSeatingArrangements

Transforming a Single Course Into a Collaborative Teaching and Learning Process

You can consider numerous strategies for collaborative teaching and learning practices in a physical classroom setting (Garrison, 2016; Gillies et al., 2008). The following are some methods that can be used in a face-to-face setting:

Round Table Discussions: Set up the class in a semicircular or circular arrangement to facilitate open discussion and equitable participation. Encourage pupils to share their opinions and participate in thoughtful discussion by posing challenging questions or introducing a topic for debate.

- Gallery Walk: Around the classroom, post examples of student work or information about a particular subject. Students can roam around, look at the exhibits, and offer comments or questions. This method promotes communication and knowledge exchange.
- Debates in class: Split the class into two or more teams and give them opposing viewpoints on a particular subject. Encourage an organized debate where students can express their opinions and counterarguments after letting them conduct research and prepare their arguments. This method develops persuasive communication and critical thinking abilities.
- Role-playing: Assign pupils to roles based on a hypothetical situation or real-life occurrence. They can then participate in role-playing games while adopting the viewpoint of various characters or personalities. This method encourages empathy, comprehension, and original problem-solving.
- Interactive Group Activities: Create group projects that demand students to cooperate to achieve a task or resolve a problem. Examples include collective art projects, science investigations, or model-building. This strategy promotes collaboration, communication, and the application of information in real-world situations.
- Simulations: Construct truthful simulations or scenarios that let students use what they have learned in real-world settings. This could be acting out professional scenarios, holding mock trials, or running a virtual company. Simulations improve one's capacity for critical thought, judgement, and problem-solving.
- Think-Aloud Pair Problem Solving: Put students into pairs and give them a problem to solve. Please encourage them to clarify their cognitive processes, including their

justifications and judgements, as they solve the problem. This method promotes metacognition and group problem-solving abilities.

- Peer Teaching and Tutoring: Assign pupils to instruct their classmates on a particular topic or ability. They can create presentations, demonstrations, or mini-lessons to convey their knowledge. By pushing students to organize and express their knowledge correctly, this method reinforces what they have learned.
- Cooperative Games: Include educational games for student collaboration to accomplish a common objective. These games may require planning, resolving conflicts, and working together. They offer a fun and exciting technique to encourage teamwork while reinforcing knowledge.
- Project-Based Learning: Assign lengthy assignments requiring students to collaborate to research, investigate, and produce a final product or presentation. This method promotes time management, cooperation, and self-directed learning.
- Collaborative technology tools can significantly improve teaching and learning in a classroom setting (Gillies et al., 2008; Roberts, 2004). The following are some well-liked tools that encourage student engagement and collaboration.
- Learning management systems (LMS) offer a central location for teachers to share materials, assignments, and announcements. Examples of LMS platforms include Moodle, Canvas, or Google Classroom. They frequently have forums, tools for turning in projects, and grading capabilities.
- Online collaboration suites include various collaborative applications, such as shared documents, spreadsheets, and presentations. Examples include Microsoft Office 365 and Google Workspace (previously G Suite). These tools allow students to collaborate and receive real-time feedback while working on the same assignment.
- Video conferencing tools: By enabling virtual face-to-face interactions, platforms like Zoom, Microsoft Teams, or Google Meet enable professors and students to communicate remotely. These solutions support live video and audio communication, screen sharing, and chat options for discussions and presentations.
- Online whiteboards: Interactive whiteboard applications like Jam board, Padlet, or Miro offer a virtual environment where students communicate, generate ideas, and collaborate on visual projects. These tools make real-time collaboration, sticky note sharing, drawing, and multimedia integration possible.
- Discussion and Forum Tools: Asynchronous student communication and conversations are facilitated through online discussion tools like Piazza, Slack, or Flipgrid. These resources give students a forum outside the classroom to express their opinions, share their views, and have in-depth debates.
- Collaborative Document Editing Students can edit and comment on the same document in real time using tools like Google Docs or Microsoft Word Online. Peer editing is encouraged, and writing and critical thinking abilities are improved.
- Social bookmarking: Students can save, arrange, and share online resources using tools like *Diigo* or *Wakelet*. These resources let students conduct collaborative research projects and share information, encouraging the evaluation of sources and developing group expertise.
- Tools like *Mentimeter, Kahoot, or Poll Everywhere* allow teachers to make interactive quizzes, polls, and surveys that engage students in the learning process in real time. These resources promote involvement, evaluate student learning, and offer quick feedback.
- Project Management Tools: Group projects can be planned and managed using tools like Trello or Asana. These technologies improve teamwork and project coordination by enabling students to collaborate, assign assignments, set deadlines, and track progress.

- Augmented reality (AR) and virtual reality (VR) tools Virtual or augmented reality experiences offered by immersive technology like Google Expeditions, Nearpod VR, or Merge Cube improve learning by bringing concepts to life. These resources allow for interactive learning and group investigation in various subject areas.
- It is crucial to choose instructional resources that fit your objectives, the subject matter, and the students' ages. To ensure students can use these collaboration tools effectively, ensure they have access to the necessary equipment and stable internet.
- Traditionally, a single-discipline course curriculum is highly specialized and focused on developing new knowledge within the same discipline. This type of course design offers no scope for collaborative teaching with other fields. Some examples include disciplines such as Physics, Chemistry, and Mathematics. However, collaborative teaching could be created in single-discipline courses involving multiple instructors with similar expertise (Fig.2). Multiple instructors could be engaged from the same institute/department or occasionally invited to deliver expert lectures covering specific topics in the same discipline.
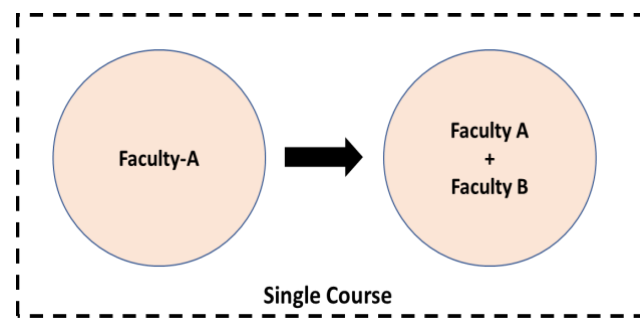

Fig.2. Transforming a single course into a collaborative teaching and learning process

Transforming Multiple Courses Into a Multidisciplinary Collaborative Teaching and Learning Process

There are advantages associated with employing multiple instructors in contrast to a single instructor for teaching single discipline courses. For example, different perspectives/viewpoints with deeper coverage of topics could be offered within the same discipline when multiple instructors are involved, which will be a fruitful learning experience for students.

Multidisciplinary course curriculum design employs knowledge from different disciplines to understand a particular topic. However, the usage of this knowledge remains distinct and does not blend. For example, if two-course fields are considered (A & B), a multidisciplinary approach would involve understanding these discipline perspectives independently to illustrate a common subject. As the course disciplines are independent, faculty A and B from respective fields could collaborate to define the common area of interest (Fig.3).
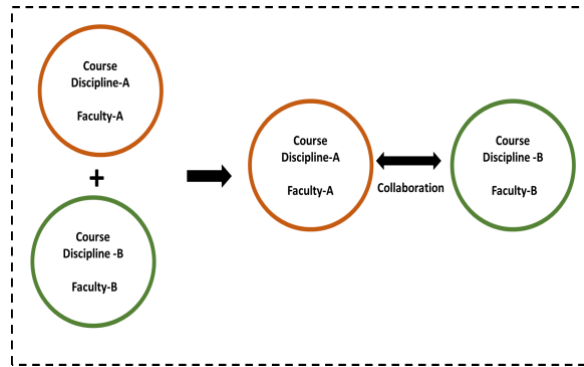
Fig.3. Transforming multiple courses into a multidisciplinary
collaborative teaching and learning process

For instance, machine learning and theoretical physics courses can be studied independently, adding to the student's overall expertise. In contrast, interdisciplinary course curriculum designs will overlap, creating new ideas and knowledge. Considering two-course disciplines (A & B), a multidisciplinary approach would involve understanding these disciplines' perspectives blended.
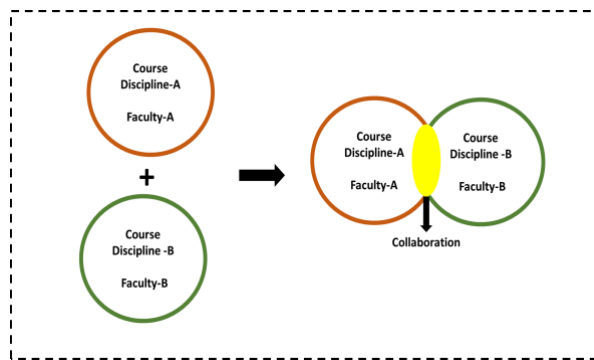

Fig.4. Transforming multiple courses into an interdisciplinary
collaborative teaching and learning process

To illustrate a new subject, dimension, or theme. Faculty A and B from respective fields could collaborate to present the latest knowledge and ideas created in the process (Fig.4). For example, the systems biology course is interdisciplinary. It involves biology, computation, and technology disciplines. The significant impact of this type of blended collaborative teaching would produce a new level of understanding and knowledge that will benefit students.

Traditional teaching-learning techniques have been based on a 'teacher-centric approach with a unidirectional teaching mode. The students learn based on the teachers' perception of the subject, limited to the learning materials and resources provided by the teacher. There are disadvantages associated with this approach. For example, a single teaching method is assumed to be suitable for all students in the classroom. However, this may not always work as students in the school belong to diverse social, cultural, and intellectual backgrounds.

In contrast, a student-centric approach is dynamic and evolutionary. It is a student-driven process through collaborative learning and teaching. For example, the teacher could share pre-reading materials to prepare students for a teaching session. In the classroom, the teacher could divide the students into groups randomly, and this group segregation could also be

student-driven at times. Group segregation would be followed by the teacher asking a series of questions, and students within the group discuss and come up with unique answers. This represents "Team-based Learning," which has several advantages compared to an individual learning approach. There are increased chances of "deep learning" in students, making them aware of leadership, responsibility, and interpersonal skills. There is scope for growth in terms of emotional intelligence and inculcation of social values.

The conventional teaching and learning process has only been based on explaining theoretical concepts in the classroom. Although this provides an understanding of the fundamental concepts, discussing or demonstrating their application is essential. The synergy of both these aspects would give a holistic teaching-learning experience. This blending approach has originated from the John Dewey Theory of "Experiential Learning." According to Dewey, students learn by active engagement with materials rather than a passive mode of unidirectional classroom listening. This is synonymous with the concept of "Learning by Doing."

Experiential learning could be achieved through many techniques, for instance, by including laboratory-associated practical sessions into the curriculum to demonstrate the concepts pre-taught in the classroom (Laal & Ghodsi, 2012). These practical sessions can also include demonstrations of the application and operation of scientific equipment. Further, Field trips or industrial visits could also be arranged during the semester, where students could understand how the 'real world' works and form networks. Similarly, bringing case studies into the curriculum can add more application value to the teaching-learning process. Furthermore, many teachers are involved in active research work in tandem with teaching. Therefore, this offers an opportunity to incorporate the research findings into their classroom lectures.

Information and Communication Technology (ICT) incorporates computers and telecommunication to depict information. These tools are practical for collaborative teaching-learning methodology and can be used anytime and anywhere (Barkley et al., 2014). Some examples include *Padlet* (https://padlet.com), *PollEverywhere* (http://www.polleverywhere.com), and *Mentimeter* (https://www.mentimeter.com/). These user-friendly tools can effectively promote collaborative teaching-learning in a classroom setting. For example, *Padlet* allows one to brainstorm ideas from a class collaboratively, and group activities can be assigned to prepare media on a web-based digital canvas. Similarly, *Poll Everywhere* is a web-based system that can create multiple-choice, open-answer polls that can be employed in classrooms to assess students' learning outcomes actively. Tools, including app diagrams (https://app.diagrams.net/), could be used by students to collaboratively draw and share graphs and flow charts online and offline. In addition, GAFE (Google Apps for Education: including Google Docs, Google Sheets, Google Drive, Google Forms, Google Slides, Google Meet, Google Sites, etc.) is a composite set of ICT tools that are excellent techniques for creating a collaborative teaching-learning experience in a classroom setting. However, for the successful employment of these ICT tools, classrooms must be provided with essential amenities such as consistent access to high-speed internet and the availability of laptops and computers. Many of these tools are also available in an app format, which can be downloaded easily on mobile phones and accessed in the classroom for a collaborative teaching-learning experience.

A Model for Creating Collaborative Teaching and Learning Process in a Research Setting

Traditionally, research work was mainly done by individual researchers. Ideas were brainstormed independently. However, in recent times, research has transitioned into a collaborative and group-driven process (Lubbe & Politis, 2023). Indeed, most of the published research papers have multiple authors from the same institute or other institutes. Sometimes, researchers from various countries collaborate to perform ground-breaking research work. Collaborative research has many advantages, including generating novel ideas and access to multiple technologies and expertise. Most importantly, collaborative research offers an increased pace in completing research projects through the division of labor.

So, how could one create a collaborative teaching-learning experience in a research setting? Generally, a faculty performs both teaching and research duties as they are two sides of a coin. Therefore, a collaborative model (Figure 5) could be generated and incorporated into the curriculum. Here, a group of students would be assigned to a teacher for their dissertation work. The students will be taught all the concepts related to the teacher's specific research area through tutorials conducted by the teacher. This will be followed up by students performing pre-research and collaboratively proposing project hypotheses, objectives, and work plans. This proposal would be presented as a group and assessed by peers and teachers. Following re-evaluation (if necessary), various directions of the project plan would be launched. Progress could be evaluated as a group during the project and whether the objectives and milestones are being met. Project results would be finalized and shared with other students and faculty, who evaluate again through peer and teacher assessments. At this stage, an external subject area expert could also be invited to assess the quality of the completed student group project. Notably, the role of the teacher would be only to guide and monitor (facilitator) the students in the group. Essentially, a design thinking approach ('Discovery,' 'Ideation,' 'Experimentation,' and 'Evolution') could be merged with this model.

This type of collaborative research work by students leads to tangible outcomes in forms such as the publication of a thesis, research paper(s), patent development, and increased placement opportunities.
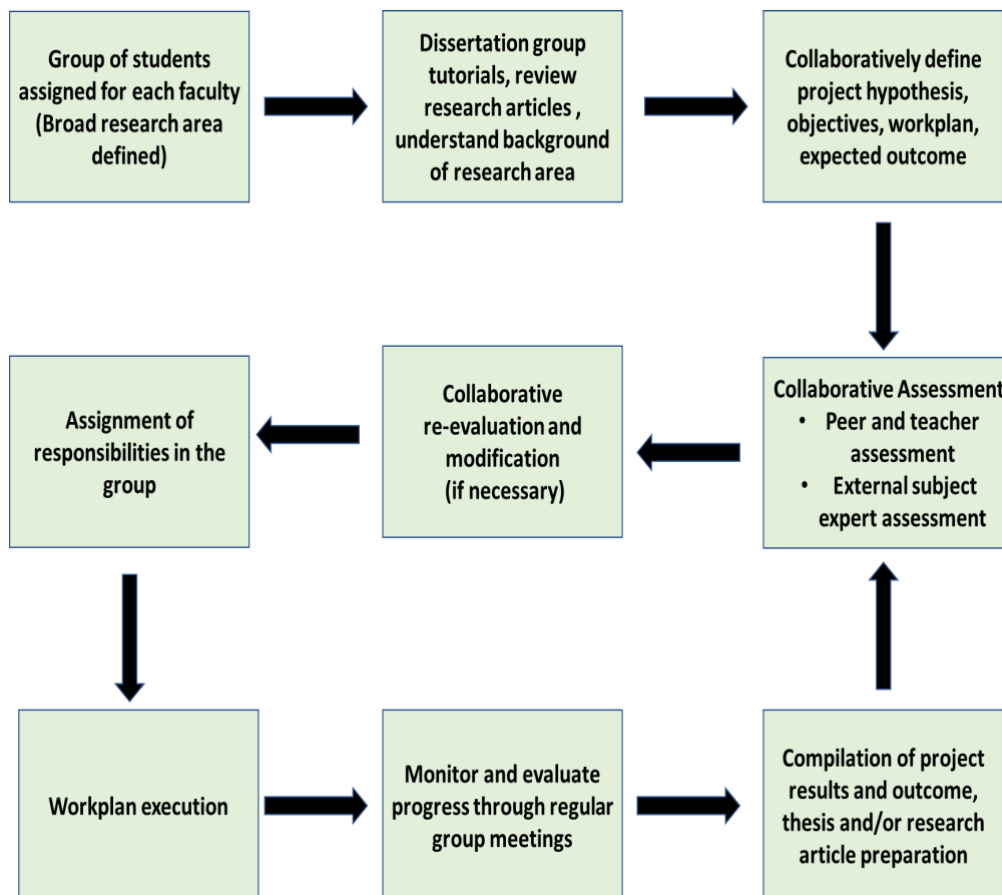
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Fig.5. A model for creating collaborative teaching and learning process in a research setting

Conclusion

In the current scenario wherer advancement in research is becoming fast-paced, firstly, there is a need for both the students and faculty to be aware of contemporary trends and need to update themselves as one cannot rely on 'Textbook' knowledge alone for advancement in research; secondly, developing the skills required to review research articles critically is also necessary; and lastly, there is a need for a common platform to share and present research ideas. This is an essential aspect of the teaching-learning process in a research setting (Barkley et al., 2014; Gillies et al., 2008; Roberts, 2004). Moving towards this direction, the organization of Journal clubs and research forums are excellent techniques for fostering collaborations. Generally, Journal clubs are conducted weekly, and a fixed schedule of students and faculty members is prepared and shared. The scheduled presenter pre-shares the research paper being presented, following which thoughts and opinions about the research paper are discussed. Journal clubs could be differentiated based on the group's students' education level (undergraduate and graduate). For example, PhD students and faculty members could engage in advanced and complex research discussions. In contrast, for Masters students, the teachers will need to provide a certain level of training. For example, students could be divided into groups, and each group could be assigned to respective faculty members. Students would get hands-on research and read research papers about their area of interest. Students would prepare a presentation from this reading that peers and teachers could assess. The role of teachers would be only to assist and monitor the students. This type of collaborative teaching-learning experience would help the students discuss with peers and teachers to comprehend better the process of selecting, understanding, and reading research articles.

Scientific conferences, meetings, and seminars are organized in a research setting to share ideas and discuss research on a common platform, i.e., regional/national/international speakers could be invited to present their ongoing research work depending on the nature of these events and the funds involved. The attendees could also be from anywhere, and events could be single-discipline or interdisciplinary-oriented (Garrison, 2016). Through these events, students can learn about recent advances in the field and actively discuss them with the speaker and audience. There is ample scope for collaborative activities, including panel discussions, breakout sessions, poster presentation events, and social activities.

In contrast, workshops are hands-on training events. These sessions allow students to learn new skills to enhance their placement opportunities. Importantly, workshops provide students with a safe environment to undergo training and learn from their mistakes. Students can form a network and collaborate with like-minded professionals through both approaches.

Lab or research group meetings are scheduled as collaborative interactions regularly among members within a research group headed by a faculty. This is an efficient method of the teaching-learning process when it is an influential research group with diverse students. The research productivity of the group is enhanced with the sharing of research ideas central to both the group and the individuals. Feedback from peers and the faculty is provided to students to assess their progress in achieving academic and research objectives. Lab or research group meetings majorly aid students in developing communication, critical thinking, and collaborative skills.

Student internships provide a predetermined timeline-based professional learning experience in a research setting. Various pharma companies and faculty-run research labs often offer paid and unpaid student internship opportunities. This is a structured teaching-learning process with defined project objectives for students to gain work experience in the field. Student internships offer faculty a chance to initiate new research projects, develop skills and train new talent who may rejoin as future employees. Student internships could be brought into the academic curriculum, where students could present and discuss their internship learning experience with peers and teachers.

Key points :
- Collaboration among industry, researchers and academic institutions can improve research quantity and quality as well as citation
- Wider visibility is attained with international co-authorship as compared to other types of collaboration
- Extensive collaborations have more chances of getting published in top journals
- Necessary funding and past collaborative networks positively affect research output
- Facilitates funding opportunities and contributes to further developing professionalism and research competence
- Interdisciplinary and internal collaboration may yield high research productivity
- Collaboration provides access to research-based knowledge rather than in-house development
- Moreover, researchers involved in inter-department collaborations tend to be drastically more productive (productivity measures), collaborative (number of co-authorship relations) and institutionally significant compared to those who collaborate only with colleagues from their research departments
- Collaborating with industry can give access to resources, skills, and equipment that may be valuable for fulfilling the scientific potential of a line of research

- Supporting students' understanding of learning
- Encouraging peer discussion
- Supporting students' collaboration
- Active problem solver, contributor, and discussant
- High expectations of preparation for class
- Responsibilities and self-definition associated with learning interdependently
- Team learning is about values and essence rather than form, as looking at peers, self, and the community acts as an additional source of knowledge
- Exposure to different teaching approaches and techniques
- Offering different perspectives on course content
- Skill enhancement, critical thinking, and an elevated level of interest
- Collaborative teaching motivates a teacher
- Colleagues tend to share ideas and exchange information about content and activities that were either successful or challenging, so they learn from each other
- Colleagues also tend to get more reflective regarding their teaching and more collaborative to reach a consensus
- It allows for the division of labor and offers the opportunity for mentoring students

Collaborative learning requires students to take on new roles adapt, and develop skills different from those they are accustomed to using in conventional classrooms. Although learning these roles and skills may be achieved continuously in content-focused learning tasks, it will be helpful to introduce students to the shift in expectations early in the class. Collaboration has taken different forms in the 21st century. Today, multidisciplinary collaborative efforts in research and teaching are disseminated in response to the complexity of problems we face and the overwhelming amount of information available on any topic, and that is one of the reasons why collaborative research is being promoted widely in industries and universities. Collaborative teaching-learning techniques have paved the way for learning environments where teachers and students can learn from one another.

References

Aldieri, L., Kotsemir, M., & Vinci, C. P. (2017). The impact of research collaboration on academic performance: An empirical analysis for some European countries. *Socio-Economic Planning Sciences*, 1–42. https://doi.org/10.1016/j.seps.2017.05.003.

Barkley, E. F., Major, C. H., & Cross, K. P. (2014). *Collaborative Learning Techniques: A Handbook for College Faculty* (Second). Jossey-Bass.

Garrison, D. R. (2016). *Thinking Collaboratively: Learning in a Community of Inquiry* (First). Routledge.

Gillies, R. M., Ashman, A. F., & Terwel, J. (Eds.). (2008). *The Teacher's Role in Implementing Cooperative Learning in the Classroom* (Vol. 7). Springer.

Johnson, D. W., & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Journal of Educational Researcher*, *38*(5), 365–379.

Laal, M., & Ghodsi, S. M. (2012). Benefits of collaborative learning. *Procedia - Social and Behavioral Sciences*, *31*, 486–490. https://doi.org/10.1016/j.sbspro.2011.12.091

Langer, G. M., Colton, A. B., & Goff, L. S. (2003). *Collaborative Analysis of Student Work: Improving Teaching and Learning*. ASCD.

Lubbe, I., & Politis, Y. (2023). Finding Synergy in Diversity during Interprofessional Team-Teaching. *Advances in Online Education*, *1*(3), 219–232.

Palloff, R. M., & Pratt, K. (2005). *Collaborating Online: Learning Together in Community* (First). Jossey-Bass.

Panitz, T. (1999). Benefits of Cooperative Learning about Student Motivation. In M. Theall (Ed.), *Motivationfrom within: Approaches for encouraging faculty and students to excel, New directions for teaching and learning* (pp. 59–68). Jossey-Bass.

Roberts, T. S. (2004). *Online Collaborative Learning: Theory and Practice*. Information Science Publishing.

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