We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,300

Open access books available

172,000

International authors and editors

190M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Chapter

Techno Pedagogical Applications in the Context of Remote Learning - Case Studies and Best Practices in Higher Education

Ajitha Nayar

Abstract

The pandemic has necessitated teachers to open up to the pedagogical applications of technology. The hand held devices that were until then, the only means of communication and casual conversations among informal communities, became vital modes of information delivery in the learning place. Teachers were caught off-guard by what was required of them and how they could make use of the resources at hand. Many institutions were not able to identify adequate trained manpower who could help them at that juncture. Looking back we can see that studies went off uninterrupted and courses were not delayed. It is heartening to see that, the pandemic, though it effected the lives of many sections of the society, education was least effected due to the pedagogical applications of technology, the availability of hand held devices and the net connectivity. The chapter draws upon, first hand experiences of teaching faculty of higher educational institutions and highlights the techno pedagogical case studies that have been deployed in the context of remote learning in the wake of the pandemic.

Keywords: techno pedagogies, remote learning, higher education

1. Introduction

The year 2020 was an year when teachers were forced to make use of handheld devices to reach to their young and adult learners. Though, the accessibility and availability of technology was ensured in many countries, how these could be used in teaching and learning were left to the resourcefulness of teachers and learners alike. After three months of close downs and lock downs it almost was realized by both the teachers and learners that the academic year was not going to be delayed or lagged and that they had to complete the prescribed syllabus. Many teachers admitted that they were caught unawares in their handling of techno pedagogies. It was alright to teach about and lecture about pedagogical applications of technology but it was a different issue when it comes to implement these in the actual classroom situations. Most teachers did not know about learning management systems and many institutions did not have the support of learning management systems like Moodle. The most handy

techno pedagogical support that they had was zoom and to some extent Google classroom. The earlier classes were plain video lectures and students were given assignments and activities to be completed on the day the topic was learnt. Many teachers had reported that, the fact that, they could not see their students made their teaching very mechanical and lecture oriented. As it is often remarked by teachers, that a nodding head in front of them is a stimulus to teachers to proceed, pause or rewind their presentations. It was lamented by teachers that the devoid of the actual participants before them had made teaching very unidirectional and very monotonous.

The best practices with regard to traditional face to face and remote teaching is the level of engagement of the learner. Research studies have revealed that students realize learning outcomes when the class has involved multidisciplinary and multi-sensory teaching. This helps to make use of all senses to reinforce the learning and concepts are associated with the different aspects of a concept. All this makes the concepts steadfast and solid foundation to the concepts.

In a traditional classroom, student engagement is ensured by an interesting introduction. Many teachers resort to anecdotes, stories and historical facts related to the topic under discussion to stimulate interest and sustain the attention of students. While learning is remote, the task of the teacher becomes quite difficult if the teacher is not competent in use of digital resources and pedagogical tools.

2. Student engagement through Techno pedagogical applications

The attributes of effective learning are retention of concepts and capability to apply the concept learnt in new and contrived situations. Effective learning can be contributed by enhancing the level of student engagement in the classroom. Student Engagement has been reported to be associated with behaviors, cognition and emotion [1].

Engagement can be assessed by level of paying attention, focus on the class activity which can be monitored by, ability to respond, participation in discussion, answers to questions, solving problems. In the traditional classroom physical proximity between the teacher and students enable recognizing facial expressions, expressions of acknowledgment, understanding, appreciating and nonverbal cues like nodding, shaking head, frowning, expression of anxiety, doubt, lack of comprehension, excitement, happiness, boredom, disgust, disengagement, engagement, level of involvement and level of participation [2].

Active student engagement is a critical factor that significantly influences students' learning and deepening understanding during online education. Many learning frameworks have been developed and experimented upon on levels of Student engagement [3–5].

2.1 Digital tools for introduction

Introductions play a significant role in the online classroom, just as in the traditional classrooms. Introducing concepts in new topics need to be made interesting to sustain student attention and ensure students are focused in the topic under discussion. Introductions need to be interesting and capture the attention of the student. Topics can be made interesting by the following mechanisms:

1. Making the subject relevant by highlighting the various applications of the concepts in the real world

2. Making the subject interesting by associating it to related areas
3. Putting across probing questions that are thought provoking and stimulating flow of ideas

In an online classroom teachers can use a host of web based resources to sustain the interest in the topic. In one of the case studies, the instructor used short videos to introduce the subject and there were question and answer sessions based on what was observed and seen in the video. This ensured responsible and attentive viewing of videos by the students. Digital story telling enables stimulating interest in the topics being handled. Interesting techniques to introduce the sessions depends on the resourcefulness of the instructors.

Teachers need to share their screen for teacher inputs, writings, power points and points for discussion. This will enable toning down on the monotony of one way lecture by the teacher. This give avenues for interaction from students and opportunities to clarify doubts and get further explanations.

Various web conferencing tools provides teachers the opportunity to diversify modes of information delivery through video lectures, video recordings of lecture, screen share, power point slides. These provisions are available in all learning management systems viz., Moodle which enables laying down the course plan, course materials and students can also upload and download their submissions for assessment. The video platforms like Zoom, Google classroom and Microsoft teams serves as video/audio platforms enable two way verbal and nonverbal communication of ideas and information.

2.2 Digital tools for discussion

The online environment is also ideal for holding synchronous and asynchronous, discussion Forums provided teachers are familiar with the facility available in various learning management systems. After presentation and explanation of basic and higher level concepts, engaging students in discussions help to identify misconceptions and highlight the significance of the concepts in real world contexts. A topic related to real world problems when given to discuss by students will invoke divergent ideas and help to stimulate innovative thinking, instilling creativity and resourceful thinking. Discussion forums when held online encourage whole class participation provided the students have an average understanding of the topic under discussion and the topic is interesting and found relevant to current times.

Discussions and debates are useful learning activities that may be done in groups. The recordings may be viewed by the teacher, later for review and assessment. Discussions may be held in the synchronous classroom or in the asynchronous mode. For effective discussions, it is imminent that the topic has been introduced and a reading activity has already been completed by the students. Only then the foundation becomes solid for raising arguments and providing insights. It is also necessary that effective discussions requires participation of all and requires an equal playing field. If the discussions are led by only one or two, it becomes a one way interaction [2].

Zoom breakout rooms have become a major feature of any remote teaching. Combined with other interactive tools or shared documents, they allow students to discuss and explore ideas with friends and classmates.

Whether online learning is synchronous or asynchronous, students not only enjoy the chance to work together on tasks and projects but also benefit immensely from the interactions that discussion provides.

If they record their video interactions, they can engage in more discussion without worrying about noting down all of the details as they will have a resource for revision at a later date [3, 4].

Best practices in online discussion forums which enhances student engagement prescribe and let students be aware of the objectives of the discussion forums.

- Information with regard to the grades to be assigned and the criteria for assessment should also be elucidated before the onset of the discussion
- The vital points that need to be included in the discussion need to be clearly listed
- For the discussions not to be a talk shop, it needs to be drawn from two three questions which need to be addressed by the students and these need to be communicated in advance in the course plan itself so that sufficient time is given to students to prepare
- It is also necessary that the points that came up during discussions are highlighted in the forums and are addressed in the classroom. Whole Information with regard to the grades to be assigned and the criteria for assessment should also be elucidated before the onset of the discussion
- The vital points that need to be included in the discussion need to be clearly listed

2.3 Online collaboration

Technology offers plenty of opportunities for collaboration with members of the academic community, researchers, experts, practitioners and workplace professionals. These collaborations and network contribute to enhancement and enrich the scope and prospects of the students, especially in higher education. The future workplace is one of collaboration and requires one to be a team player rather than a lone path maker. There are many collaborative tools which encourage to team with and invite peers or members of the community for sharing information, review of literature, discussion and inputs of comments, opinion, structuring and developing models in unison. These enable to work synchronously and ensures active participation with the focus on doing rather than mere talking. It facilitates results and reinforce learning in a short span of time.

Online collaborative tools are web-based tools that enable teachers and students to perform a wide range of tasks, such as interactive discussions, online collaboration activities, sharing and accessing electronic learning resources, and many more others (**Figure 1**) [4, 5].

GitHub is where over 73 million developers shape the future of software, together. Contribute to the open source community, manage their Git repositories, review code like a pro, track bugs and features, power their CI/CD and DevOps workflows, and secure code before they commit it [6].

Slack in Higher Education gives students what their prospective careers hope to work them on and make them career ready. Gives them insights to problems prospective employers are working on and interested in and also the solutions they are looking for. It also gives a peep to the prospective work environment Slack is where the future works [7].

Figure 1.
List of online collaborative tools that provide opportunities for students to engage in teamwork.

3. Case studies

These case studies emerge from feedback received from practioners comprising of teacher educators, pre service teachers and teachers of higher educational institu-
tions based on their deployment of techno pedagogical practices in their classroom.

The chapter draws upon first hand experiences of teaching faculty of higher edu-
cational institutions and reveals the techno pedagogical case studies that have been
deployed in the context of remote learning in the wake of the pandemic.

This research paper collects feedback from teaching faculty of teacher educational
institutions. The sample also comprised of pre service teachers of select teacher

educational institutions the feedback was collected from teacher educators (N1 = 18) through handouts with regard to details of pedagogical practices deployed by them for teaching the topic entrusted to them. The handouts listed the details that were to be described viz., topic outline, phase of the instruction, instructor activities and student’s activities, applications and online resources used, details of teaching/learning online platform. Data was collected from handouts administered to the participants comprising of teacher educators (N1 = 18) and pre service teachers (N2 = 67) in March 2021. Both the teacher educators and pre service teachers were associated with teacher educational institutions of a state in India.

A panel of experts comprising of senior teacher educators with more than 25 years of experience in teaching and administration participated as experts and rated the inputs of teacher educators and pre service teachers for identifying the best practice based on the following criteria:

- i. Whole class participation ii. Level of interaction iii. Multimedia presentation iv. Multiple pedagogical applications v. Activity based instruction.

Demographic aspect	Description	Sample size
Age,	>45	7
	30–45	11
	<30 and above 20	67
Seniority,	Senior level	7
	Middle level	11
	Junior level	67
Branch (art, science etc.),	Education	85
Course name	Education	85
Course level,	Graduate course education	85
Date of feedback.	02-03-2021	

4. Best practices

The best practices for remote learning and Technopedagogical applications point out to being identifying the rightful resources and resorting to value and respect the time allotted for the lesson. Judicious selection of activity and timely remediation of difficulties that are encountered is essential to boost and sustain student presence in class and attention to topic.

The best practices were selected based on the description of the lesson plans submitted by the participants. The best practice for each context- introducing, learning, explaining/presenting, and concluding and assessment – was identified based on the criteria of level of student engagement, use of multiple resources and level of student activities imparted. The following figures gives the details of instructor and learner tasks for each context (Figures 2–5).

4.1 Identification of digital tools

There are a host of digital tools and only few are relevant and ideal for Higher education. The digital tools most compatible with the level of the learners need to be deployed. Sticking to one online web platform for lecturing, interaction with students

Figure 2.
Case study 1: Techno pedagogical applications while introducing the lesson.

Figure 3.
Case study 2: Techno pedagogical applications while planning a discussion on topic.

and class room activity makes both teacher and students increase their level of comfort in the chosen topic. It is best that an institution focuses on a particular leaning management system for all the courses. This provides ease of access and ease of use to the students. However, the digital tools used for instructional activity may be at the discretion of the instructor and will rely on the resourcefulness of the instructor. Such successful practices and interventions need to be communicated and shared with other members of the teaching community in the best interest of the student community.

4.2 Selection of appropriate digital resources

For the introductory lesson and for introducing concepts, digital resources that are identified need to be easily understandable and comprehended by the learners.

Figure 4.
Case study 3: Techno pedagogical applications while concluding the lesson after all student activities and student assessments.

Figure 5.
Case study 4: Techno pedagogical applications while assessing students.

These in itself should be interesting and engaging so as to enable sustained interest in the topic that is be discussed subsequently. The teacher notes also could be used as digital resources as it is likely to be in simple language and enable better understanding of the corresponding lecture. Very long resource materials which cover more than 10 pages need to be discouraged and in such contexts the page numbers highlighting most relevant and related concepts need to be indicated. The selected reading resources need to be closely corresponding to the topics to be studied and under discussion. Very

elaborative and detailed resources may be given in the concluding sessions so as to encourage students who wish to further their understanding on the underlying scope for research. Kognity is a fantastic tool because you can set reading assignments for students. The website allows you to check who has completed the assignments by a set deadline and you can assign questions to check understanding. Another tip is to create short video tutorials to allow students to work independently and to understand instructions [4].

4.3 Assessments of learning outcomes: remote learning

Limiting the mode of online assessments to select few and most appropriate for the student activity and compatible with objectives of the instruction, so that the most relevant learning outcomes are attended to. Though it is recommended to experiment with various modes of assessments, it is necessary that students are made familiar with the technology before implementation in the class. It is best to rely on cloud based tools which saves time of installing and saves disk space. However, the level of net connectivity required should not be a hindrance in use of these tools. Research shows that students learn more in active learning classes, and in fact perform better on assessments, but still feel they learned less [8, 9].

Studies have reported that Digital rubrics are an excellent way to provide meaningful and uniform feedback as a department. Online quizzes can also be assigned to provide instant feedback. Game-based formative assessment tools like Kahoot!, Quizizz, and Quizlet Live have been found to be excellent online student assessment applications [3].

5. Communications to students: tips for teachers

Derby, Flora (2017) has listed the following tips for teachers resorting to teaching in remote mode

- Talk to your students just as you are in the classroom
- All class and instructional activity need to be shared and informed well in advance so that students can pace their instructional tasks well ahead
- Teachers need to post end of the week announcements so as to brief and remind students activities for the forthcoming week and draw attention to what is expected and what needs to be completed before the onset of the next session
- All instructions needs to be clearly spelt out and step wise activities to be detailed vide mail or in class announcements in the LMS
- During the pandemic many teachers resorted to WhatsApp groups which facilitated better sharing of information and timely communication of decisions
- Timely feedback to students needs to be taken care of. In large classes with student strength above 30 a teaching assistant or research assistant may be used for sending communications.
- Setting appointment times for the students who need help or advice needs to be arranged and initiated by the teacher

- Teachers need to respond to the questions posted in chat box and provide timely responses
- Grade and return students' work in a timely fashion.

6. Discussion

The case studies described here are pointers to feasible and practical solutions to instructional strategies that are deemed suitable for remote teaching and learning contexts. The fact that these were implemented by teacher educators and pre service teachers reflect their ease of deployment. The case studies were identified as best practices based on the select criteria.

Case study 2 highlights a lesson where a topic is introduced. A topic where students do not have any background knowledge. The strategies used for making it as interactive as possible with considerable level of student engagement is by making available recording of lectures, exposure to multimedia content on YouTube [10].

Case study 3 highlights Techno pedagogical application comprising of student activities which encompasses blended learning. Learning of the topic commences before the assembly of students and teachers. Making use of videos and audio for capturing live discussion among students engage interest and sustain different modes of student assessments through poll surveys and quizzes. Studies have reported similar applications in higher education learning contexts [3, 11, 12].

Case study 4 highlights Teacher activity on concluding a topic and imparts additional resources for reading to reinforcing learning. The remote teaching/learning platform provides contexts to the teacher to deliver concluding remarks and stimulate students to comment on the further applications of the topic. It also provides scope for students to explore current developments on the topic and direct attention to real world problems related to the topic [10, 12–14].

Case study 5 reports on teacher activities that occur also in traditional classroom activities. But, these are assessments of submissions of students uploaded on online platforms viz., Moodle, Mail, Google classroom. There are AI applications which can assess the student submissions too based on text analysis whereby saving time for teachers. Activities like recording of presentations, Inviting feedback from participants via poll survey/chat box, Critical review of responses, Peer feedback and review provides opportunities to learn from the mistakes and correct responses of peers [3, 10–14].

7. Conclusion

The activity centered classroom of remote learning mandates multi learning and multi instructional tasks. Verbal and nonverbal cues are not observed in such classrooms so teachers need to plan and design activities to sustain the interest and attention of students. What is required of teachers is to judiciously use and select the most appropriate digital resources and tools which takes into consideration constraints of time, net connectivity and class size. Teachers need to take time to plan and acquire competency in deploying these tools for remote learning in the best interest of students.

IntechOpen

IntechOpen

Author details

Ajitha Nayar
Kerala University of Digital Science Innovation and Technology,
Trivandrum, Kerala, India

*Address all correspondence to: ajithanayar@gmail.com

IntechOpen

© 2022 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

References

- [1] Bempechat J, Shernoff DJ. Parental influences on achievement motivation and student engagement. In: Christenson S, Reschly A, Wylie C, editors. *Handbook of Research on Student Engagement*. Boston, MA: Springer; 2012. DOI: 10.1007/978-1-4614-2018-7_15
- [2] <https://johannesu.com/2020/06/10/discussion-forums-in-online-teaching-pros-and-cons/>
- [3] Venton BJ, Pompano RR. Strategies for enhancing remote student engagement through active learning. *Analytical and Bioanalytical Chemistry*. 2021;**413**:1507-1512. DOI: 10.1007/s00216-021-03159-0
- [4] Zayapragassarazan Z. COVID-19: Strategies for online engagement of remote learners [version 1; not peer reviewed]. *F1000Research*. 2020;**9**:246. DOI: 10.7490/f1000research.1117835.1
- [5] Ahshan R. A framework of implementing strategies for active student engagement in remote/online teaching and learning during the COVID-19 pandemic. *Education in Science*. 2021;**11**:483
- [6] <https://github.com>
- [7] Slack is where the future works. <https://slack.com>
- [8] Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H, et al. Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*. 2014;**111**:8410 LP-8418415
- [9] Deslauriers L, McCarty LS, Miller K, Callaghan K, Kestin G. Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proceedings of the National Academy of Sciences*. 2019;**116**:19251 LP-19219257
- [10] Derby, Flora. 2017. How to Be a Better Online Teacher. chronicle.com
- [11] Gemmel PM, Goetz MK, James NM, Jesse KA, Ratliff BJ. Collaborative learning in chemistry: Impact of COVID-19. *Journal of Chemical Education*. American Chemical Society. 2020;**97**:2899-2904
- [12] Evans, 2020. 5 Ways to Boost Engagement in Remote Learning | *Tes Magazine*
- [13] Tingley SC. Teaching Strategies for the Remote Classroom (wgu.edu). 2020. Available from: <https://www.wgu.edu/.../teaching-strategies-remote-classroom1906.html>
- [14] Minero E. 60 Second strategy. Discussion mapping. 2020. Available from: <https://youtu.be/iH6SRBzlaHw>