Reminiscing about the Challenges and Coping Mechanisms of Teaching Styles during the Pandemic and Sustaining Today

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***Abstract*—The COVID-19 pandemic triggered online education so fast that now it has become mandatory for new-normal education systems to accommodate online education tools in day-to-day teaching. The digital education surged, making teachers forget about the chalk-and-board methods: the long-lived traditional method of teaching. Digital education tools, such as PowerPoint presentations, virtual labs, and short concept videos, are mandatory as students transition from the Covid-19 era to new-normal education classes. Toggling between the two teaching styles and trying to accommodate all types of learners in the learning process has always been a challenge for teachers. This article discusses the toggling of teaching-learning styles and presents a case study of the author's educational institute in India during the pandemic, along with students' testimonials. They affirm the impactful engagement during the pandemic. The author confirms that the adoption of online tools helped educators survive the pandemic and sustain in today's world.**

***Keywords*—digital education tools, new-normal education, digital education, concept videos, pandemic**

I. INTRODUCTION

The COVID-19 period was the most challenging period of the twentieth century. It had a deep impact across all aspects of life in the modern digital age. It introduced many uninvited gadgets into the lives of school-going kids: smartphones and tablets, to name a few! The need arose because education cannot be halted due to COVID-19. The authors would like to quote an example of a very famous school, Jyanprobodhini Prashala, situated in Pune. The moment the lockdown was declared, the school sent a meeting invite to all parents and explained how they would conduct online lectures for these secondary school students. It was amazingly overwhelming: the technical higher education institutes were still mulling over how to continue, while the school had already begun online teaching!

Online meeting platforms such as Zoom, Google Meet, MS Teams, and FCC were available for conducting the sessions. The students were adapting very fast to this learning style, and teachers were learning "how to teach using these tools"! It was a truly transformative phase for a teacher… not only for the school teacher but also for the professors.

As a professor, it was very challenging to keep the students motivated to attend and participate. It was an online education program where neither teachers nor students could see each other. The author would like to quote an anecdote over here: *"The sunflowers take energy from the sun to bloom when it rises. The question arises, what happens to those flowers when the clouds cover the sun? The sunflowers gain their energy by looking at each other!! What a beautiful way to keep blooming!!"* The teachers are just like the sunflowers. They get their energy to bloom from their students. And online education was like cloudy weather when the teachers couldn't see the sun to get energised! It was tough to stay motivated and keep the students engaged and learning. The author discusses the transitions she faced and how she coped by revising her teaching style. The next section will provide an overview of the teaching-learning methodologies adopted during the period 2004 to 2020, in line with capturing the essential and gradual changes in the strategies.

II. LITERATURE SURVEY

The author discusses a variety of strategies proposed and implemented by other educationists and researchers during the above-mentioned span. Blended learning and the integration of digital tools in education were topics of academic focus well before the COVID-19 pandemic. Understanding this progression is essential to framing the post-pandemic shift toward toggling between online and traditional teaching and learning methods. *Bernard et al*. [1] conducted a foundational meta-analysis comparing classroom instruction with distance education. Their results suggested that blended approaches were more effective than purely online or face-to-face methods, especially in higher education contexts. Researchers observed a change in students' understanding levels with a shift in the approach.

Zhao et al. [2] further examined what makes distance education effective by analysing different instructional settings. Their work emphasised the importance of context, learner characteristics, and course design, laying the groundwork for future studies on blended modes. *Tallent-Runnels et al.* [3] reviewed the literature on online teaching methods and instructional design. The review focused on identifying key trends and gaps, particularly in student engagement and teacher preparedness. *Lim, Morris, and Kupritz* [4] explored faculty and student perceptions of online versus blended learning environments, finding that satisfaction and learning outcomes varied significantly based on instructional design and support.

Researchers like *Means et al.* [5] conducted a meta-analysis of empirical studies to compare the effectiveness of online and traditional instruction. The study concluded that blended formats were often more beneficial than either format alone. *López-Pérez et al.* [6] investigated further how blended learning affects dropout rates and learning outcomes. Their findings showed a positive relationship between well-structured digital interventions and reduced student attrition. *Drysdale et al.* [7] analysed trends in blended learning through doctoral dissertations and theses, showing growing interest in hybrid learning models and the need for teacher adaptability.

Boelens et al. [8] identified four key challenges in blended learning: flexibility, interaction, personalisation, and course coherence. These issues are central to the challenges educators face as they toggle post-COVID. *Halverson et al.* [9] analysed highly cited studies on blended learning and identified pedagogical and technological themes that influenced the development of instructional strategies. At the end of the pre-COVID period, *Raes et al.* [10] reviewed synchronous hybrid learning environments in higher education. Although published in 2020, their study, conducted pre-COVID, identified the pedagogical strain teachers felt in managing both in-person and remote learners simultaneously—a direct precursor to post-pandemic challenges.

Section III will discuss the challenges faced and how the teacher worked to overcome them, despite unseen challenges on the family and academic fronts.

III. DISCUSSION OF CHALLENGES

The author has taught two subjects: Artificial Intelligence (AI) for final-year engineering students and Digital Signal Processing (DSP) for third-year engineering students. The author would compare the educational styles during the pre-COVID-19 and COVID-19 periods. The next session will discuss the challenges faced during COVID-19 online education.

A. Challenge 1: Awareness of the online teaching-learning platforms and related tools

The first step in online education was to make them aware of the meeting platform's features. The Google Meet platform was selected at the author's institute. It has a whiteboard. To encourage student participation during the Artificial Intelligence Class, the author used a whiteboard to solve search algorithms in the AI subject. It created a competitive environment in which students could solve the sums quickly. Everyone could see who was solving on that whiteboard. There were 3-4 boards available, and students used all of them to solve it.

Figure 1 depicts the students' participative and enthusiastic approach to learning.

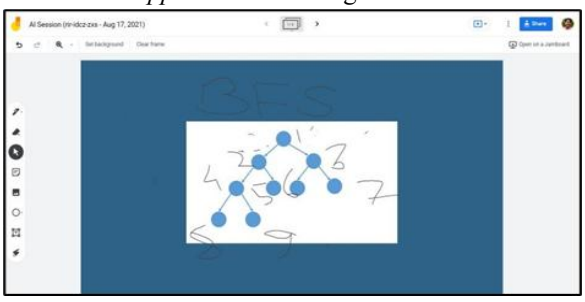


Figure 1: DFS and BFS algorithm implementation in the AI subject

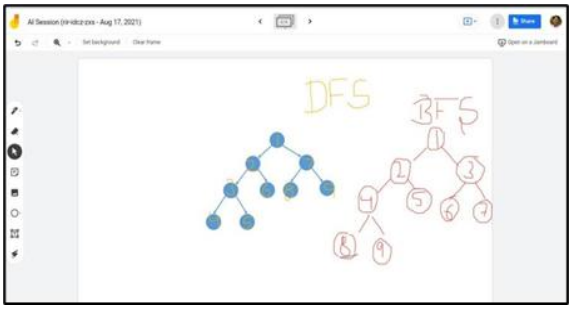


Figure 2: Understanding algorithms with collaborative learning

B. Challenge 2: Students' engagement in online mode

There are a few algorithms in the field of Artificial Intelligence, such as Depth-First Search (DFS) and Breadth-First Search (BFS). The graphical approach will help students understand the concept, so the whiteboard feature in Google Meet was used to encourage students to participate and solve related sums. It was a collaborative work by the students. The teacher opened four different whiteboards for a collaborative solution to DFS and BFS problems. The class was not only collaborative but also interactive and competitive as each team tried to solve it faster. Figure 2 shows such collaborative learning.

Further, students explored other impactful learning platforms, such as Analytics Vidhya, and completed free certification courses. Figure 3 summarises the students' certifications.

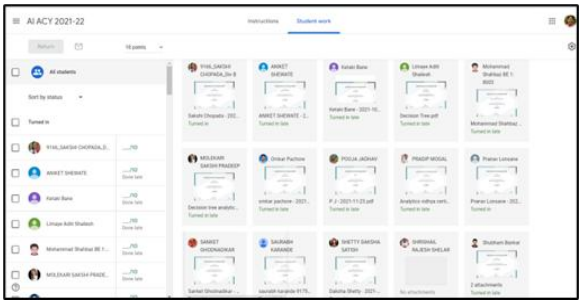


Figure 3 shows the Certification record of Analytics Vidhya courses

C. Challenge 3: Encouraging them to prepare the hard topics

In AI, there are many algorithms named search algorithms. They are used to design single-agent and multi-agent games. The search strategies are challenging to understand unless a numerical example is used to clarify the idea. The author provided them with links to videos by Dr John Levin from Imperial College London, UK. The flipped classroom technique was then used, and the author asked the questions. The questions were set to check their understanding, not just their conventional knowledge. The questions included comparisons of the algorithms, why one is used despite other powerful algorithms, what changes should be made to improve the algorithms, and real-time applications in online games. Such brainstorming during the flipped classroom made them strong, and they no longer needed to recite the algorithms. Figure 4 depicts a word cloud summary of key terms by students on the topic of 'Reinforcement Learning'.

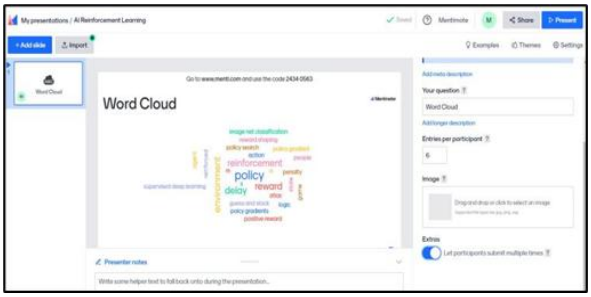


Figure 4: Reinforcement Learning Video Summary in Word Cloud

Later, as the outcome of this activity, they were asked to prepare a video of the discussed algorithm, and the author rewarded them for preparing the insightful video. The methodology itself demonstrated the "Reinforcement Learning"- a famous algorithm in AI, among the students.

IV. SUMMARY OF LEARNING

Teaching is not a one-way street but a bidirectional process in which mutual learning enhances the experience of both. It further adds many more analogies for hard concepts. Collaborative learning encourages students to share their understanding and ideas about the subject. Subjects like AI need up-to-date information, with extensive reading of research articles from Google and Intel. The preparation for the video encouraged many students to learn video editing, practice the video's content, choose a suitable platform for uploading, and finally upload the video successfully. The teacher rewarded the students with a 'Travel Sack' as they prepared informative videos on hard AI concepts, such as the A* search algorithm.

A special workshop on "Online Teaching & Learning Tools" was conducted for the faculty, with students volunteering, and the demonstration of online tools was successful due to their active participation. They used their learning during their project presentations and seminars held as part of their internal assessment. This

complete workshop changed their presentation style and confidence in handling the evaluation in online mode. A Google Meet whiteboard proved to be the best tool for solving problems collaboratively in online classes.

Teaching and learning are the two sides of a flipped coin. Any side you get, it's the part of the other side.

Table 1: Summary of Challenges of Online Education

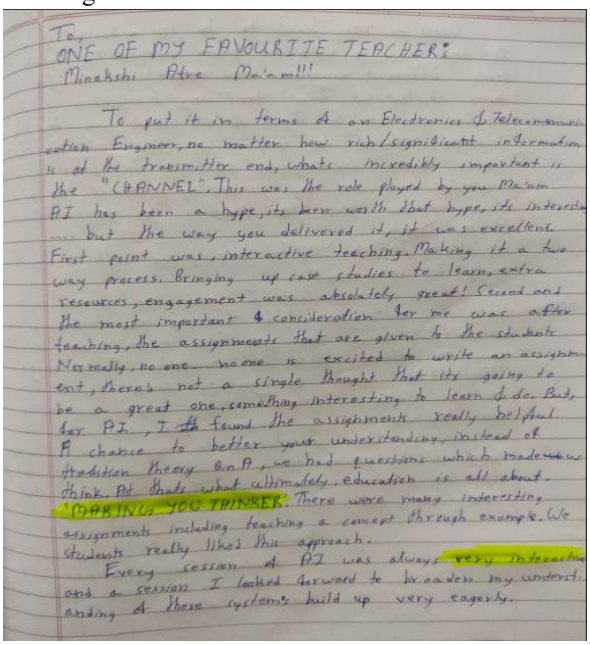
Sr No	Challenges identified	Remedial actions
1	Awareness of the online teaching-learning platforms and related tools	Conduction of faculty workshops with students as volunteers to demonstrate the tools
2	Students' engagement in online mode	Making them conversant with online teaching with the help of online platforms like Analytics Vidhya
3	Encouraging them to prepare for the hard topics	Holding a video preparation competition for hard topics by giving them standard references
4	Celebrating National Days online, which, otherwise, in offline mode would have increased interactions among the students	Celebrated Engineers' Day in online mode – watched videos together to understand the role of an Engineer in society

With students' great support and online tool literacy, the class became more interactive, collaborative and participative. As a guest teacher, when he visits another college, the student crowd is different, and a teacher may need to adjust their teaching strategy. So, a teacher needs to be a good learner and should be able to flip the other side of the coin whenever there's a change in the class, course, or college.

The AI class proved to be highly experimental, with the inclusion of a variety of Online Education tools, such as whiteboards, Mentimeter word clouds, and other features. The engagement did not stop because of the online mode; it extended to celebrate Engineers' Day in ONLINE mode and to share students' thoughts and definitions of an engineer.

The end of this beautiful AI class left carved memories not only of the subjects but also of how to collaborate, support, and grow together. Figure 5 shows the engraved memories of our AI class during the pandemic, which left an impact on the subject of AI as a tool for progress and for connecting the world.

Even today, when communication among Covid-19 batch students occurs, it is often emphasised that these AI tools are surely the way to stay ahead in the fast-evolving world of AI.


To,
ONE OF MY FAVOURITE TEACHER!
Minakshi Atre Ma'am!!!

To put it in terms of an Electronics & Telecommunication Engineer, no matter how rich/significant information is at the transmitter end, what's incredibly important is the "CHANNEL". This was the role played by you Ma'am. AI has been a hype, its been worth that hype, its interesting ... but the way you delivered it, it was excellent. First point was, interactive teaching. Making it a two way process. Bringing up case studies to learn, extra resources, engagement was absolutely great! Second and the most important & consideration for me was after teaching, the assignments that are given to the students. Normally, no one... no one is excited to write an assignment, there's not a single thought that it's going to be a great one, something interesting to learn & do. But, for AI, I found the assignments really helpful. A chance to better your understanding, instead of traditional theory Q&A, we had questions which made us think. At that's what ultimately, education is all about. 'MAKING YOU THINKER'. There were many interesting assignments including teaching a concept through example. We students really liked this approach.

Every session of AI was always very interactive and a session I looked forward to broaden my understanding. These systems build up very eagerly.

Figure 5: AI Memories

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