Attendance and attention monitoring – a perspective in digital pedagogy

Dwaipayan Saha¹, Indrani Mukherjee¹, Jesmin Roy¹, Dr. Bikramjit Sarkar¹, Rupak Bhattacharjee²

¹Department of Computer Science and Engineering, JIS College of Engineering, Kalyani, West Bengal, India
²Department of Mathematics, JIS College of Engineering, Kalyani, West Bengal, India

Corresponding author’s email address: sarkar.bikramjit@gmail.com

Abstract. Technology has played an integral role in the field of education. Its prominence and efficacy have proved to be a great boon for the people in this New Normal after the severe outbreak of COVID-19. Although the entire world is confined among the four walls, it is the technology that contributed a lot by enabling the conduction of online classes through different Learning Management Systems and multidimensional efforts of student-teacher fraternity. Earlier the Distance Learning was prevalent but was not given much importance owing to own limitations. This period of emergency has identified and highlighted the need and immense contribution of technology in digital pedagogy through online mode. In this paper we have surveyed various ways, where technology has played a gigantic role in the field of education. Various techniques for monitoring the attendance of the learners are also explored. Identifying several problems and related drawbacks of the digital transformation in the pedagogical approach, we have proposed some dynamic systems that can resolve certain issues efficiently and effectively. Solutions to mitigate the problems of attendance and to prevent the lack of attention/concentration of the students during the conduction of the online classes are presented.

Keywords: Digital pedagogy, new normal, attendance, attention.

1. Introduction

With the country under nationwide lockdown in order to stop the spread of corona virus, everything got setback. This deadly virus brought a sudden turning point into everyone’s life and it channelized everyone’s life to a different perspective. The education premises had a major setback; the entire education sector is relying on technology to keep the learning on. From manufacturing own automatic mask machines to COVISAFE, it’s not only about engineers and doctors, but also students who are pitching in to make the use of technology to its zenith for gaining knowledge. Advancement of technology is boon in this pandemic. With the advancement of technologies lots of problem arises and so does the problem regarding attendance and attention.

Teaching and learning with technology, prior was mostly limited to subsidiary collaboration tools for communication, learning management systems and electronic texts. The technology was simply an electronic support to traditional didactic mode of teaching. But, in this new normal, the approach of online classes is serving at its best; but it can only make up to the aura to some extent. So, this paper
mainly focuses on the proposal of solution about problems arising due to conduction of online classes and to be more specific the attendance and attention problem during online classes. Certain approaches which are proposed will not alter the existing education system but their augmentation to the system will bring a new perspective. A survey has been done among the students, teachers and parents to have the knowledge about their view-points regarding online classes. We have analyzed various problems depending on some parameters about which questions were asked in the survey. Taking a note of all the problems, remedies have been provided which is applicable to many areas of concern as it is not confined to only lockdown time, it can be used after lockdown and also it can be scaled to a higher version.

2. Literature review
Many studies have been published to cover the most important topic of concern for everybody, the world-wide pandemic and its effects over us. Kumar Jain et al. [1] focused on how technology is helping to fight against corona virus. It deals with the implementation of technology in the course of education. Tech desk by the Indian express [2] published a blog on “Education amid COVID-19 lockdown: Technology to the rescue with online classes”. Various technologies were used by the educational institutions for prolongation of the regular classes. Veena Shenoy et al. [3] discussed about COVID-19 lockdown adaptation, teaching, learning, student’s engagement and faculty experiences.

All the educators were trained about the usage of virtual platforms and later they got habituated. Bulbul Dhawan et al. [4] highlighted the fact, how smart classrooms are transforming India’s education system. Virtual classrooms and various online tools are contributing a lot towards online education. The works of Kalachugari Rohiniet al. [5] laid emphasis on Face Recognition Based Attendance System For CMR College of Engineering and Technology. Praseetha et al. [6] laid emphasis on problems of online teaching and, how it could be implemented. Nandhini R et al. [7] described how Microsoft is helping in providing remote learning to the students during this phase. Shelmy Mathai et al. [8] highlighted the contribution of government upon launching e-learning portals, like, DIKSHA, e-Pathshala, Swayam, etc.

3. Attendance Problem
In the present scenario, where the present platforms of technology have been explored and used to the apex, there is now some more need of advanced technology that can take the legacy of technology forward. When these online platforms were being utilised to such an extent, a lot of flaws have come up to the forefront. One of the major drawbacks has been the attendance and the inconsistency of a particular student while attending a class on any digital platform.

A survey was performed on a group of 160 college students, who are an active part of the present digital pedagogy. In Table 1 quantitative conversion of the responses related to the attendance parameter is presented. In similar survey on a group of 60 teachers, from various institutions teaching at both college and school level was performed and their responses related to the attendance parameter are quantified in Table 2.

| Questions                                           | Students facing the problems (in %) |
|-----------------------------------------------------|------------------------------------|
| Do you face problems regarding attendance           | 100                                |
| Instances where you have not received the attendance despite doing the class | 62                                 |
| Very often the discrepancy of the attendance issues are occurring | 55                                 |
Table 2. Responses of the teachers

| Questions                                                                                      | Teachers facing the problems (in %) |
|----------------------------------------------------------------------------------------------|-------------------------------------|
| Students reporting the discrepancy of the attendance issues                                 | 100                                 |
| Agreeing that students are found to be most eager during the time of attendance call          | 55                                  |

![Occurrence of students not getting attendance](chart.png)

Figure 1. Survey which evidently shows there is mismatch of attendances report

Thus, it has been observed that students have joined their online classes, and then get indulged in doing something else. They are not present in the class mentally but since their name is visible in the list of participants they are getting the attendance. At times, it so happens that a particular student is doing his/her class diligently, but the time when the attendance is being given, he/she gets disconnected owing to some network issues. Thus, he/she does not get the attendance of the class which he/she has actually attended. Many a times students falsely report of not getting the attendance.

It is also evident from the survey that students consider attendance to be the most important part of the class, and do not pay heed during the class. So you solve these problems we have discussed the method below.

4. Attention Problem

Being present in a class and understanding and learning the subjects done in a class are two different cases. The former requires a student to have only a physical existence in the class whereas the latter demands a student to be present both physical and most importantly mentally. In the traditional classes, it is easier for a teacher to detect whether a student is attentive or not. But problem arises with the advent of online classes. It is nearly impossible for a teacher to understand whether a student is at all paying attention or not. The accesses to social networking apps during online classes are one of the major reasons why students do not pay proper attention during class.

In Table 3 and Table 4, the responses of students and teachers related to attention parameter are highlighted respectively.
Table 3. Responses of the students.

| Questions                                                                 | Students responding positive to the query (in %) |
|---------------------------------------------------------------------------|-----------------------------------------------|
| You are active on WhatsApp during online session/class                     | 93                                            |
| Highly active users of WhatsApp or some other social media applications during the course of time | 78                                            |
| Students who do not get assignments regularly on WhatsApp during class    | 72                                            |
| Students who discuss about the topics taught in class with their friends using WhatsApp during the class is going on | 69                                            |

The students thus, are discussing among themselves and not properly listening and paying attention in the class. In case they have any doubt related to the topic that is being taught in class, they prefer to discuss among themselves to take help from the teacher who is a veteran unlike them.

From this survey it has been observed that nearly 62% students lose interest in class. And the reason for this has been observed to be disinteresting subjects, or ambience. Nearly 11% students have said that they often lose interest and around 9% students have said that they lose attentiveness very often. Thus over 80% students have complained and stated of lacking attention during the classes.

Thus, 40% of the students in a class do not respond at all. Thus they are not at all attentive during an online class. Their sole motto to attend a class is to get the attendance. Gaining of knowledge and listening to the teacher attentively has lost its importance in the sea of online lectures.

Hence, it is statistically evident that the students are not attentive during the online classes. Owing to the missing spark and lively aura of a classroom, online classes fail to maintain the attention of students, and result in such a drop in the attention level of such a large number of students.

Figure 2. Graph showing the result of survey regarding attention of students during online classes.
Table 4. Responses of the teachers.

| Questions                                                                 | Teachers responding positive to the query (in %) |
|--------------------------------------------------------------------------|-------------------------------------------------|
| Most of the students are usually inactive during the course of the class | 84                                              |
| Less than 60% students respond during class                               | 67                                              |
| Very often the discrepancy of the attendance issues are occurring       | 55                                              |

Another perspective of our survey was to know the views of the guardians regarding the above mentioned issues. Table 5 presents the responses of the guardians, which are kept for further analysis but the proposed idea in this paper, will also address the concerned issues of the guardians.

Table 5. Response of the guardians

| Questions                                                                 | Guardians responding positive to the query (in %) |
|--------------------------------------------------------------------------|--------------------------------------------------|
| Does your ward face problem related to his/her daily attendance in class  | 78                                               |
| Do you observe your wards being busy in WhatsApp during the course of the class | 60                                               |
| Do you find your ward not paying sincere attention during class          | 46                                               |
| Any behavioural change observed in your ward                             | 43                                               |

5. Solving the problem of attendance using facial recognition and AI

In this new normal, digital pedagogy has risen to its zenith. There is a quantitative problem that persists regarding the actual and faulty attendance. From the survey it is evident that there is an existing discrepancy regarding the attendance of the students. To remove this discrepancy and make the online teaching-learning more viable and enhance the procedure of taking attendance, we developed a unique procedure in which the students will be unaware of the fact that they are being marked for their attendance.

Our developed system will monitor the network connectivity of all the students as soon as they log in. The period for which the attendance will be given will be preselected by the teacher before the starting of that particular class. The system is trained in such a way that it will automatically turn on
the webcams of the students at suitable times and click the photographs of the students at suitable intervals within the particular session. A predefined number of photographs of every student will be captured during the course of the session. During the session, face of the students will be matched with the existing photographs of the students using the Local Binary Pattern Histogram (LBPH) algorithm which recognizes both the front face and the side face of the student. And finally, the processed images will be computed at the student’s end and then the data will be sent to the teacher’s end where the data will be further processed. Thus, the required and adequate information will be stored in the database of the student to ensure them attendance.

6. Solving the problem of attention through facial recognition and AI

Through this pandemic period despite of conduction of online classes, there is an underlying problem of monitoring the attention of students. It often happens that students are not attentive enough and it does not come to the notice of the teacher. Thus to eradicate this discrepancy and make teachers aware of the attention status of the students during ongoing online classes, we have proposed a viable solution to ensure smooth management of classes. The problem of attention monitoring is a qualitative one and hence needs to be addressed more delicately with much importance.

We have designed a system that will monitor the network connectivity of all the students as soon as they log in. The system is trained in such a way that it will automatically turn on the webcams of the students at suitable times and will determine the time duration for which the students is looking out of the screen via the webcams of the students. This particular data will be compared with the predefined data for different age groups of students to signify the effective attentiveness of a particular student. Each student’s data will be processed individually and in the user end the teachers will retrieve useful details required from the data and the final information will be reflected in the respective accounts of the students’ database. Thus, the system will monitor a particular student’s attentiveness during the classes.

---

Figure 4. Work flow diagram showing the working of facial recognition to monitor attendance
7. Future Scope
Our surveyed paper highlighted certain approaches as remedies for the attendance and attention problem. Technology is advancing at a rapid rate and other aspects such as Augmented Reality, Virtual Reality and Mixed Reality can be taken into consideration for the better approach of our remedies. Virtual Reality (VR) and Augmented Reality (AR), are such a boon of technology which can make the students feel like being in a classroom, and can maintain their attention and can also help the students to grasp the subject better and faster. Mixed Reality (MR) mixes the real and virtual worlds to produce new environments and visualizations. MR with the help of augmented and virtual reality breaks through the traditional norms of education and thus, enabling direct experience about the items boosts up the engagement of the learners in the class environment and also encourages efficacious interaction of people over the platform. Viewing and visualizing the items in three dimensions help students to have a better understanding how they really appear. Mixed reality is not widely used in current years but it has the potential to take the digital learning to a great height in the upcoming decades.

8. Conclusion
In this research paper we mainly focused on the attention and attendance problem faced during online classes; and tried to solve the problem accordingly. In this paper, we have analyzed various problems and surveyed teachers, students and parents. They have given their valuable feedback regarding the virtual learning process. We studied the survey and prepared reports and consequently focused on the problems that were given higher priorities. Graphs and charts were also prepared to pictorially depict the report. Main cause of concern was found out to be regarding degenerating attention among students, according to reviews given by teachers.

Another major factor comes out to be attendance. Most teachers reviewed that either students only respond during attendance or they join the lectures at the time of attendance. So, to eradicate these issues which can make the base of virtual learning weak; we have proposed technologies like facial recognition with AI to take attendance and record attention level of students. With the inclusion of
AR, VR and MR the attention problem could meet considerably. Presently, we have formulated these solutions at an initial level, later it could reach new heights.

References

[1] How technology helps in the fight against corona virus. Amit Kumar Jain and Surbhi Jain, 2020. Link:https://www.thehindubusinessline.com/opinion/how-technology-helps-in-the-fight-against-coronavirus/article31160578.ece.

[2] Education amid COVID-19 lockdown: Technology to the rescue with online classes By: Tech Desk | New Delhi | Published: April 8, 2020 https://indianexpress.com/article/technology/tech-news-technology/online-education-covid-19-lockdown-online-classes-6351798/

[3] ISSN NO: 2347-3150 Ms. Veena Shenoy, Ms. Sheetal Mahendra, Ms. Navita Vijay Mukt Shabd Journal Volume IX, Issue IV, APRIL/2020.

[4] https://www.financialexpress.com/education-2/covid-19-how-smart-classrooms-are-transforming-indias-education-system/1948670/COVID-19: How smart classrooms are transforming India’s education system By: Bulbul Dhawan | Published: May 5, 2020.

[5] International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-4S2 March, 2019. Kalachugari Rohini, Sivaskandha Sanagala, Ravella Venkata Rathnam, Ch.Rajakishore Babu.

[6] Mobile-Cloudlet Face Recognition: Two Different Approaches Praseetha V. M, Ankit Bansal, Vadivel S. 2017 DOI: 10.17706/jcp.13.1.116-129

[7] International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-8, Issue-3S, February 2019 Nandhini R, Duraimurugan N, S.P.Chokkalingam.

[8] International Journals of Advanced Research in Computer Science and Software Engineering ISSN:2277-128X (Volume-7, Issue-6) Naema Mohamed Kutty, Shelmy Mathai Department of Computer Science and Engineering, Cochin College of Engineering and Technology, Kerala, India DOI: 10.23956/ijarcsse/V7I6/0268.