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Research Article

Impact Study Of Covid-19 Pandemic On Web Technical Education

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Abstract

The CORONAVIRUS epidemic has forced the worldwide transformation of sudden face-to-face instruction in web formats at most of the educational establishments. Immediate and cautious planning is needed to reduce the impacts of the epidemic on content-based, hand-crafted engineering and technical education and design. To evaluate web engineering and technical education during the epidemic, we did a study at KIET Group of Institutions, in Ghaziabad (one of the private engineering institute). The sample size of 100 faculty members and 1000 students from different engineering departments take part in the study and answered a qualitative question to clarify the problems they faced while teaching web during pandemic. For example, approx. half of the students showed a lack of classroom involvement, difficulty keeping their focus and weariness of the MS Team after attending many web meetings. Combined analysis showed that while asynchronous semi-web tests were associated with an increase in perceived fraud by educators, fully web or open / open tests of notes were associated with a decrease in the teacher's perception of cheating. To discourse the various obstacles identified, we have recommended the strategies of education stakeholders to fill the tools and technology gap and enhance web engineering teaching. These references are operative methods for many related institutions around the world and can help increase web learning outcomes in areas under engineering. As the epidemic continues, sharing the results of this study with other teachers can help to effectively and selectively develop best practices to improve the performance of web engineering and technical education during CORONAVIRUS and post-epidemic.

1. Introduction

Engineering education has always focused on traditional content, hands, focused on construction, and focused on developing critical thinking or problem-solving skills [1]. Various teaching methods have been shown to be effective in improving engineering and technical education including practical learning [2], classroom learning [3] and project-based learning [4 - 6]. Over the past decade, web education has become an integral part of higher education in the fields of electrical and computer engineering, computer science and information technology, especially at the master's or post-graduate level [7].

While web education was not new to teachers in general, the CORONAVIRUS epidemic has identified an unprecedented and global need to explore web teaching / learning opportunities at all levels of education and majors.

According to UNESCO, since the outbreak, more than 1.5 billion students worldwide (90.1% of total enrolled students) have been affected by the closure of CORONAVIRUS and subsequent

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educational changes [8]. The sudden closure of many educational institutions around the world has forced the transformation of face-to-face education into a completely (or integrated / mixed) web format in a short period of time. As a result, educational institutions that focused on traditional customs face-to-face faced various obstacles to this change [9].

Emergency, careful and evidence-based planning is needed to reduce the impact of the epidemic on engineering and technical education especially for at-risk, disadvantaged and disadvantaged students facing greater obstacles beyond their educational responsibilities, including family responsibilities, financial burden and increased employment [10 - 12]. Further efforts need to be made to ensure that web engineering courses still meet the critical requirements for accreditation of a program such as the National Board of Accreditation (NBA).

With the exception of existing web engineering and technical education literature, to our knowledge, there has been no comprehensive (quantitative and qualitative) analysis of the obstacles and obstacles of the web engineering and technical education epidemic at universities that have provided many challenging classes. The project aims to address this gap by considering the following two questions:

1. What are the major obstacles affecting web engineering and technical education during the CORONAVIRUS epidemic of institutions that focus on traditional face-to-face education before COVID?

2. What are the insights and recommendations for dealing with these obstacles?

The Sloan web learning organization has defined five pillars of web higher education such as: vocational training, student satisfaction, psychological satisfaction, access, scale, and cost [1]. Given this issue, we are developing and conducting research among faculty members and students of KIET Group of Institutions, Ghaziabad (KIET) to systematically investigate the obstacles they face during the sudden transition from face-to-face to web learning mode and 2020 This paper presents research results and solutions suggested to improve web engineering and technical education. Sharing the results of this experimental study with other teachers can help to make a powerful improvement in engineering and technical education during the ongoing epidemic. It can also help with overall development and as a result improve web education in the post-epidemic period especially for universities that have been focusing on traditional face-to-face education. KIET is one of the institutions with diverse student backgrounds by race, ethnicity, financial status and culture (eg with a large percentage of first-generation or low-income students). Therefore, the results of this study can be especially helpful to the same people to improve their web engineering and technical education during and after the epidemic.

Related work

The existing literature has identified several obstacles that must be considered for effective design and delivery of web courses:

• Converting courses from traditional classroom format to web format is very time-consuming and requires teachers to be familiar with (or willing to) learn about) e-learning teaching Methods and teaching tools, including learning management systems (LMS) [13].

• Some students prefer the concept of face-to-face learning difficulties [14] and believe that face-to-face teaching provides deeper learning compared with web teaching [17].

• It is difficult to design a fair, just and rigorous evaluation in an web environment to minimize cheating and plagiarism [16].

• Successful education requires the creation and maintenance of a solid and reliable infrastructure to support teachers and students [7, 15-19].

• Practical training in the use of equipment, instruments, and materials in a controlled laboratory environment is an inherent and necessary aspect of successful engineering and technical education [1, 10]. Solving this important issue on a fully web teaching platform is challenging, especially at the undergraduate level.

Recently, several studies have attempted to identify the main factors and best practices that contribute to the acceptance, absorption and success of web education, including course design, support for course content, personal characteristics of teachers and students' familiarity with technology and access to resources [20-22]. Due to the sudden conversion of novel coronavirus pneumonia (COVID19) to web teaching, teachers and students in academic institutions that have mastered traditional face-to-face instruction have faced several obstacles. As the pandemic progressed, a small piece of literature on the educational impact of COVID19 began to appear. A group of researchers conducted a national survey of teachers and students in the STEM field in the United States in June 2020. Their results highlight the gender differences in web learning during the pandemic: Compared with male peers, female teachers and students face more obstacles in distance learning adaptation and technical issues [12]. They also found that 35.5% of doctoral students, 18.0% of master's students, and 7.6% of undergraduates will delay graduation due to the pandemic [11]. Compared with whites, Hispanic students and black students are twice and 1.7 times more likely to delay graduation, respectively.

Dhawan comprehensively reviewed the existing literature on web teaching methods, and at the same time identified the advantages, disadvantages and obstacles of using each web education method during the COVID19 pandemic [9].

Vielma and Brey conducted a qualitative survey of 170 students taking asynchronous courses in the two engineering departments (biomedical engineering and chemical engineering) of the Hispanic service organization in the United States [10]. The goal is to evaluate the effectiveness of your web education during the pandemic. Their results indicate that students need to synchronize teaching content (except asynchronous content) to improve the social component of learning.

Almaiah et al. Conducted semi-structured interviews with 30 students and 31 information technology experts from 6 universities in Jordan and Saudi Arabia (using a general topic list as an interview guide rather than a structured question list). Its aim is to identify the obstacles that hinder the successful application of web education during the pandemic in developing countries and provide those interested in education with useful guidelines to improve the efficiency of education.

Our work conducted a comprehensive survey (quantitative and qualitative) of students, faculty, and staff in various engineering subfields of America's largest and most diverse four-year university (KIET). Therefore, the work presented has several unique aspects that distinguish it from the few existing studies focused on web education during the pandemic, such as the simultaneous use of quantitative and qualitative survey questions, and a large number of projects from various subfields. Participation of students and teachers and of different origins. Our

observational research provides empirical evidence of the various solutions we propose to strengthen web engineering and technical education during and after the pandemic, especially for those with limited resources or large numbers of minority, first-generation, and low-income college students.

2. Materials and methods

2.1. Engineering education at KIET

KIET Group of Institutions is recognized as one of the best engineering colleges in Delhi-NCR. Founded by the members of Krishna Charitable Society in 1998 with a modest number of 180 students, KIET Group of Institutions has now become a pioneer in the technical education domain with a strength of 6000+ students.

With a rich alumni base of 16000 + students spread in all the nooks and corners of the world, KIET Group of Institutions is moving efficiently towards its vision of shaping young minds with skill-oriented & value based education as these alumni serve the dual purpose of mentoring the present students, as well as opening new doors for them[24].

The institute has gained a distinct image as an outstanding educational colossal among the technical institutions of Uttar Pradesh, due to its inclination towards innovative and skill-based education. Its consistent belief in 'Achieving High' is aptly reflected in its academics, extracurricular activities and placements. The success of its belief is clearly brought out in the plethora of Education Excellence Awards bagged by the institute. The institute has been accredited by NAAC with Grade 'A' and its programmes (CSE, ECE, EEE, IT, ME, CE, MCA, MBA and Pharmacy) are NBA accredited.

The unprecedented circumstances of the global CORONAVIRUS epidemic forced the rapid transformation of the teaching method from face-to-face to full web to all engineers over a period of 15 days in March 2020. KIET advised educators to focus more on learning / using MOODLE (and MS Team video conferencing) to convert their instructions into web formats. This recommendation seems reasonable given the availability and functionality of MOODLE features. However, our students and professionals are experiencing various obstacles during web teaching and Even 2020. At the end of the semester in May 2020, KIET announced that the Odd 2020 semester will also be in another direction.

2.2. Surveys

Our aim was to identify and study the magnitude of the various problems our faculty and students encountered during the six weeks of web instruction at Even 2020 and to plan for advanced web teaching at Odd 2020. 2020 web. The technical study consisted of 10 multiple-choice questions and 2 free answers, while the student survey included 8 multiple choice questions by completing or additional comment options for each question.

The technical research questions included a variety of web educational issues including, but not limited to, unavailable hardware (eg computer / tablet, pen, scanner / printer, microphone / headset, camera), software and web reliability. Other questions focus on the various learning test methods used by teachers in Even 2020 (or those they planned to use in Odd 2020) including open or closed book tests, parallel or mini-tests, full web tests (using random questions in MOODLE) or in semi-web tests (where students solve problems on paper, and then scan and upload their solutions to

MOODLE). Other questions focused on proctoring tests and the apparent increase in cheating. Faculty has also been asked to indicate topics that are of interest to them in developing their skills, e.g. Basic or advanced features of MOODLE, MS Team features, automatic grading, etc. Two open-ended questions gave educators additional opportunities to comment on their web teaching experience and make any suggestion or request a COE that could help improve web education in Odd 2020.

Student surveys are designed to identify the obstacles students face while teaching web at Even 2020, including the unavailability of hardware, software, reliable web connection, a quiet / private learning environment, potential barriers to balancing study and family work. , and stress management. Students were also asked about the difficulties they had during the corresponding classes in the MS Team (e.g., non-focus or involvement, teacher technology incompetence) or during web tests (e.g. time management, problems with how to use the camera in advance).

3. Results

Technical research was conducted using a management software over a period of three weeks . Similarly, a student survey was designed and conducted on management software thereafter. The latest timeline was determined based on the assumption that more students (including non-enrolled students) would be available to take part in the study near the beginning of the year Odd 2020 (August 21). Participation in both surveys was unknown.

100 teachers and 1000 students participated in the study: First-year students (15%), second-year students (20%), third-year students (30%), fourth-year students (35%). We note that all departments have similar presentations depending on the percentage of student and student participation in relevant research (9% ME, 5-10% CE, 15-23% ECE, 19-22% CS, 18-22% EN, and 21-26% MBA).

This percentage corresponds to the size of our departments in terms of the total number of faculty and students.

3.1. Logistical obstacles for both students and faculty

Below are a percentage of study respondents who indicated the various dietary obstacles they had during the Even 2020 web period. About 15% of faculty had software problems or did not have access to a personal computer / tablet. About 20% of the ability did not have access to a microphone / headset or printer / scanner. 23% Smartphones did not have a reliable web connection, while 32% did not have access to a webcam or web instruction camera. Finally, 10% of the faculty indicated that they did not have access to or had technical problems with web writing tools. Among the student respondents, 2% had no access to any computer / tablet, and an estimated 10% had access to only a shared computer at home. 8% did not have web access, while 26% had problems with the reliability of their web connection. 28% reported problems with software access, and 26% did not have a printer / scanner at home.

3.2. Students obstacles with web instruction

Below summarizes the increase in the obstacles students faced with web education during 2020). About 70% of students have experienced difficulty in maintaining their focus or experiencing fatigue of the MS Team after going to multiple times web .[21] 55% of students experience social networking from their peers / peers, while 64% do not feel involved during web classes. 60% of

students see the need for clear guidance or communication from teachers. Also, a quarter of students had problems with web installation of assignments and tests, mainly due to the unavailability of printer / scanner availability as we learned in the students' choice comments. Approximately 40% of students had technical issues and problems with not using or navigating through MS Team or MOODLE. 48% of students experienced time management problems during web exams. In optional comments, some students expressed frustration at not being able to return to previous questions (a MOODLE feature for teachers to reduce cheating). 23% of students indicated that the teacher's unavailability during an web test (unlike a personal exam) created obstacles.[21]

48% of students reported that they did not have a camera or felt uncomfortable to turn on the camera / microphone during class or web tests (question # 7 in student survey). Optional comments revealed that many participants have privacy issues with the use of camera / microphone or recording, especially if they live in a crowded home or shared space. In addition, some students are experiencing an increased level of anxiety viewed on camera that hinders their focus and reduces their performance during web tests. 28% of students indicated that they had difficulty balancing work and study. From optional comments, we realized that the last issue had been raised by many during the epidemic.

Our research also showed that more than 50% of our students do not have access to a private or quiet place to attend web or study courses. 55% of students also have no motivation to study (question # 3 in student research). Optional comments shed light on the lack of motivation: the CORONAVIRUS epidemic and the loss of performance / peer support have been identified as major contributing factors. Finally, 24% of students rated their web teaching skills as satisfactory, 37% found it unsatisfactory, and the rest (39%) were neutral.

3.3. Methods used as assessment during web instructions

Below is a spread of the various methods used to intelligently test students' learning during the Even 2020 web tutorial. Semi-web refers to a test in which students solve a given problem on paper, and then scan and upload their solutions. The Asynchronous test refers to a take-home test while the synchronized test is the one that takes place during the scheduled class or test time. The study allowed respondents to select more than one method per question (because intelligence may teach multiple classes, do more than one test per year or use multiple test methods in one class), so the total percentage was not equal to 100.

We see that fully web tests like MOODLE queries are used by 63% of faculty. MOODLE queries provide an intelligent option for easy random ordering and / or query values. The instructor can also limit the view to one question on each student page and make them return to previous questions. The effectiveness of these options in reducing cheating / cheating, and consequently the reduced need for further performance, may contribute to the high likelihood of this method of testing among intellectuals.

The remaining methods for growth slowdown were project / time paper (50%), parallel web testing (40%), oral presentation / testing (33%), and semi-web asynchronous semi-test (28%))%). Our study also found that 70% of the unit used open / open tests while 33% tried to close / close textbooks. The choice of open-book / open-note exam among the faculties can also be changed with the reduced need for learning tools. In fact, our data (professional test question # 7) revealed that among those managers who used the open / open test, only 27% used the MS Team camera

and microphone to perform the test. 21% used key browsers, while 61% had no proctoring. However, while the tests were a closed book / closed book, 56% of the competent decided to take the test using the MS Team camera and microphone, 18% chose to use the closing browsers and 35% did not use them.

4. Discussion

In this, we discusses about the obstacles identified and propose relevant interference to improve the web delivery of classes during the pandemic.

4.1. Student obstacles

Our results showed that one-third of our students did not have access to a reliable web connection, which raised concerns about widening the digital equity gap between students due to the CORONAVIRUS epidemic. With CORONAVIRUS and the sudden switch to web teaching, access to a reliable web connection and personal computer/tablet has become a significant factor affecting student learning outcomes. To address this issue, the facility can provide WiFi access to campus open spaces and well-ventilated facilities while recognizing public disturbances and regular site cleaning. For those who need computer equipment, a loan system can be used to borrow laptops for some time to get practical study resources and complete course needs. The center can also provide a virtual desktop environment so students can access all the required software. Using free scanning programs on Smartphones or tablets can address the lack of access to scanners.

Our study also showed that about 30% of engineering students have limited problems, while 55% have no motivation, and 50% have no private space to attend classrooms. These findings are consistent with those reported in a recent study conducted in the Biomedical and Chemical Engineering departments of a Spanish-based institute [10]. While the percentage of our students who had problems with lack of motivation or private space seemed high, both studies highlight the need to provide additional social and emotional support for students during difficult times.

Students found several obstacles in synchronizing web course teaching through MS Team, including lack of peer support/interaction, focus, participation, and clear guidance from teachers. They also expressed the difficulty and fatigue of the MS team's time management. Peer support/interaction has been shown to increase the success rate of students, especially those from disadvantaged groups [24]. The lack of peer support in web teaching in the COVID19 era will have a negative impact on students' learning motivation. However, the remaining questions raised can be partially solved by teachers using appropriate teaching techniques, as follows: divide long lectures into shorter parts, take more frequent breaks, encourage group discussions among students, and be available during exams for They provide a clear web course map and provide live lecture recordings after the lecture The latter will help students with difficulties learn at their own pace [10]. For the problem of exam time management, teachers can design simulated test questions so that students can familiarize themselves with the setting of the questions before the actual test and adapt to the test style.

The epidemic has led to the loss of education, delays in graduation, cancellation of student training and loss of employment. A new generation of students who have been away from face-to-face instruction may not have had some learning experience. For example, there may be a generation of engineering students who have done most of their laboratory work almost and, therefore, lacked true skills. While the epidemic of epidemic education will affect everyone, it is more likely to

affect low-income students more deeply [25]. As a result, social and economic factors will be important mediators in defining the educational gap that can be large and varied. This gap can have long-term consequences for income inequality and health inequality [26].

To reduce the education gap, universities can use the practice of developing and using diagnostic tools to learn how many errors are and how big they are. Based on the information they have acquired, they can offer short correction programs with longer curriculum revisions to suit student learning levels [27]. For example, a summer session dealing with laboratory safety features or tests can be done. In some cases, close collaboration may be needed between teachers who teach the lessons in sequence, so they can develop external factors or suggest activities that will help students close the gap on a particular topic. As the epidemic continues, university policy flexibility can also help reduce the educational gap especially for those students with low social and economic status. Allowing students to adjust their study load, assignment time, and tuition payment system will enable them to make effective decisions to reduce academic loss [25]. The need for further research on the above is undeniable.

4.2. Faculty obstacles

Establishing system quality standards related to web education is essential for web education. Effective communication is a key factor in bridging differences and coordinating administrators and faculty members to improve web education [28]. We have quite a few teachers who report that they do not have access to necessary hardware, software, and web teaching tools. Especially in the absence of traditional blackboards in the classroom, many teachers and staff expressed the lack of web writing tools. This problem can be solved by allocating the agency's budget to obtain the necessary hardware and tools (eg PC / tablet with webcam, digital pen for touch screen device, digital clipboard, document camera).

It is not easy to develop an web learning assessment method that is as rigorous as the traditional face-to-face setting to avoid cheating or plagiarism [16, 29]. Although it is not possible to propose a single assessment method that is suitable for all engineering courses and class sizes, do research on various exams and assessment methods web (such as web quiz tools in LMS, open-book exams, or for take-home, student speeches, peer review activities, cooperative quiz [30], oral assessment [31], course summary essay, or web portfolio) overlap each other. Since the beginning of the pandemic, a limited number of studies (mainly in areas other than engineering) have been conducted to assess the success and obstacles of web assessment. Research in [32] shows that although most college management students need more time and energy to prepare for web exams (compared to traditional exams), they believe that the clear and timely grading and feedback functions of web exams have a great advantage. Another recent study showed that cheating remains a major problem with web exams and must be solved using available technologies, including web monitoring and randomization of exam questions [33]. Few other studies have shown that web exams increase the stress and anxiety levels of medical students [34,35]. The additional pressure is partly due to the lack of a strong testing platform and the lack of sample web practice exams for students.

Our student survey results showed that using a camera / microphone to perform web tests can increase equity concerns (for those who don't have access to a camera and can't afford it) and privacy concerns (monitoring student private space). To address these legitimate concerns, experts

are advised to select alternatives to cheat during web tests. Random quiz by pushing both problematic statements and multiple-choice decisions, and randomly selecting a set of questions in a library with a variety of different / random variables are practical solutions. Fortunately, many LMS offer these options. However, although 99% of US postecondary institutions use the LMS, about half the capacity in those institutions used it regularly [37]. As a result, many intelligent members were unaware of the basic or progressive features of the LMS or other effective web teaching tools. Our survey result confirmed this comment. In fact, our expertise has identified a wide range of topics related to MOODLE or other web teaching tools that they see as necessary to improve their skills. Institutions can address this issue by arranging training sessions, webinars, short courses, and discussion panels to improve their web teaching skills.

Practical training is an integral part ofengineering and technical education. After Even 2020 suddenly converted the course to an web format, many teachers used simulations or processed data that had already been obtained to complete their engineering student course projects. Our survey shows that teachers need to understand other effective ways to provide hands-on training / experience. Depending on the content of the course, it may be helpful to use a "home lab kit" and record lab experiments.

However, the design, preparation, distribution / collection, or experiment records of laboratory equipment can be time consuming for teachers, especially considering all the access restrictions to campus laboratories and additional safety precautions imposed by the COVID19 pandemic. A virtual laboratory may be a more effective solution. In addition, whenever possible, remote access to the laboratory can be used to set up experiments on campus and students use remote control and setting management tools [10].

4.3. Summary of proposed interventions

From the analysis of the survey results we propose several intervention strategies that can be employed by stakeholders at different levels to improve the web instruction of engineering courses. The proposed strategies (the targeted issues and the survey questions that identified them) are summarized as follows:

➢ ***Strategies for institution/engineering administration***

• Budget allocation to provide basic web educational resources to both students and students in need. Examples of such devices include a personal computer / tablet via webcam / camera, web typing tool, reliable web

• Creating a virtual desktop environment and allowing faculty and students to access the required software

• Organizing faculty / student workshops to further familiarize themselves with web teaching / learning technologies and tools

• Providing an web syllabus template includes all the key details needed for NBA certification

• Development and planning of a systematic web resource-related resources resource development

➢ ***Strategies for engineering faculty***

• Leverage the institution's LMS for course management, grades, forum discussions, and exams (to improve faculty's web teaching skills when the need has been pointed out to answer questions). 10-12 of the faculty survey) a long lecture in shorter segments with more frequent

• Encourage group discussion or problem-solving activities among interactions with peers as indicated in student survey question 4).

• Be available for exams (eg in the MS team) to answer student questions

• Provide students with clear roadmaps and instructions for the web course

• Provide live conference recordings after the conference

• Manage student practice exams

• Use open-book / opennote and assessment methods Synchronization supports academic integrity. Examples include random / limited time / LMS question groups

• Avoid using cameras/microphones to monitor exam

• Using a "home test kit", recording practical experience and room virtual experiments to partially address the actual training aspect of courses

➢ ***Strategies for engineering students***

- Free scanning programs are used on their Smartphones

Many of the proposed solutions have been developed in the KIET Group of Institutions in preparation for the Odd 2020 semester.

This work contributes to the developing body of knowledge on the effects of the epidemic onengineering and technical education by investigating the obstacles and obstacles faced by a large group of engineering and technology students at KIET which is an example of an institution that previously taught face-to-face engineering classes (in particular), with very few social and economic gaps. Recommended strategies for various education stakeholders (including students, faculty and management) aim to fill tools and technology gap, develop expertise in teaching web courses using the full use of web learning management tools, and, ultimately, suggest effective test methods for web studies while considering potential equality and privacy issues . These recommendations are effective methods for many similar institutions around the world and can help improve web learning outcomes in all areas of engineering.

4.4. Potential limitations of the study

There are some limitations that need to be addressed in this study. We studied the obstacles of engineering web education in Even 2020, when the pandemic started and the global emergency hit. Therefore, reported experiences and perceptions may have been influenced by confounding factors associated with the onset of the pandemic. As the pandemic continues and various academic players explore and find new strategies to better adapt to the new standard, further studies conducted in the near future may provide the picture. more precisely on web technical education.

We announced the surveys to all faculty and students in the KIET group of institutions by emailing notifications to their university email accounts in the summer of 2020. While the response rate for

the faculty survey was 44%, the response rate for the student survey was 12%. A low student response rate can lead to some bias in the participation in the results.

Our main objective of the research was to identify the immediate needs and obstacles of our students' general body and expertise without focusing on any of the underrepresented groups. Our assumption was that the number of people who participated in the study was about the same as those in the College of Engineering. Additional studies involving census of race, race and socioeconomic status are needed to investigate the magnitude of the educational obstacles that non-representative groups face during this epidemic compared to other groups. Consideration of specific institutional information (eg marks, student intelligence / study comprehension, financial aid applications) from both before and during the epidemic can improve the subject.

Existing activity did not update performance and stability of each intervention performed. Nor did it compare the effectiveness of the various test methods designed for web education engineering. Follow-up research is needed to address these limitations.

5. Conclusion

We have implemented an observation study to recognize obstacles that occur due to sudden transitions on web statements for technical courses in the Covid19 pandemic by surveying (quantitative and qualitative) the students and the faculty in our organization. Many logistics, techniques and learning / teachings of different have been identified, and some interventions have been proposed to solve them. The results of this study develop greater knowledge authorities on the effects of the pandemic of technical education. This study also provides empirical evidence for suggested strategies for improving (and thus further promotional) web technical education in and postponed. Our future work will be a thorough investigation to assess the effectiveness and sustainability of each proposed intervention.

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