Ur Rehman, M. et al. (2020) Assessment and Feedback Under Disruptive Circumstances in Trans-National Education. In: IEEE TALE 2020, 8-11 Dec 2020, pp. 287-294. ISBN 9781728169422 (doi:10.1109/TALE48869.2020.9368427)

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Deposited on 14 September 2020

Assessment and Feedback Under Disruptive Circumstances in Trans-National Education

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Abstract—The COVID-19 pandemic outbreak, the lockdown and social distancing strategies adopted to contain it have drastically affected our daily lives and the routine businesses. Provision of educational services in a continuous and useful manner in such circumstances is a massive challenge and requires innovative methods. Effective assessment and feedback plays a pivotal role in traditional teaching and learning approaches and its importance even more in disruptive conditions. This paper discusses different assessment and feedback techniques in an online delivery of higher education courses in lockdown scenarios. The effectiveness of these approaches is evaluated through qualitative and quantitative study of student and staff feedback for an engineering course being delivered as part of a transnational education (TNE) program. In the light of the results, recommendations are made to improve the assessment and feedback activities in disruptive circumstances.

Index Terms—COVID-19, Higher education, Assessment and Feedback, Online teaching, Disruptive circumstances, Transnational education.

I. INTRODUCTION

The COVID-19 outbreak has dramatically changed lives throughout the world. This global pandemic has brought a dramatic paradigm shift in our life style. Many businesses have either transitioned to on-line model or greatly reduced their activities by accommodating the World Health Organization's "*social distancing*" recommendation [?]. Education sector has also come up with measures to ensure the safety of pupils and teachers while providing the continuity of educational process under these difficult circumstances.

In global terms, the majority of the higher education institutes use traditional face-to-face mode of delivery, where the transmittal of educational contents is carried out by the teacher while being geographically co-located as the students [?]. It requires physical presence of the students on-campus for the lectures, laboratory practicals, tutorials, and assessments [?]. The onset of the COVID-19 pandemic has disrupted the working model of these universities through the cancellation of the face-to-face mode of delivery and switching to online digital methods in the majority of higher education institutes to ensure the safety of staff and students in the wake of the pandemic [?]. Even though online learning is not a new concept, its use as an emergency response to the pandemic brings huge challenges, along with some benefits, for both the instructors and the students. Some of the associated challenges are the need to redefine policy and strategy for teaching, assessment and feedback; prepare engaging content; increase interaction; develop time management strategies; and cope with mental and physical stress and self-motivation [?].

Assessment and feedback are the two most critical pillars of the learning cycle [?]. Previous research has shown that feedback is an indispensable step in the learning process and feedback, in particular formative feedback, serves as a catalyst for students' learning by enabling them to restructure their understanding and enhance their skills [?]. Clear assessment of student's work and effective feedback given to them indicates the success of the student's learning and teacher's delivery. The results of an assessment influence students for the rest of their lives [?]. It also provides information to teachers about the level of student's understanding and hence modify their teaching style and focal point [?]. It also has been shown that students who develop self-assessment skills by acquiring metacognitive skills can regulate and manage their learning more effectively [?]. Effective feedback also has been shown to be a key factor underpinning successful learning in post-compulsory education [?].

In the aftermath of the COVID-19 pandemic, it is imperative for the instructors to also focus on issues related to equity and inclusiveness apart from focusing on instructional effectiveness [?]. This is because previous research has shown that certain students (generally those who have poorer socio-economic or academic background) stand to lose more (i.e., they suffer a greater "*online penalty*" [?]) compared to their more privileged compatriots even when similar online learning opportunities are provided during a well-known online learning penalty, which is more for the underprivileged students.

This paper discusses methods of assessment and feedback adopted in higher education institutes countering effects of non-presence of the student and staff on-campus and ensuring continuity of student development under disruptive circumstances. Effectiveness of these methods is analysed through experience of the students as well as staff exposed to these methods in lockdown situation. Based on the results, recommendations are made that could help in improving the assessment and feedback practices in such situations.

The rest of the paper is organised in the following way. Section II presents the state-of-the-art on conventional assessment and feedback methods. Section III discusses the changing practices in assessment and feedback in disruptive circumstances. Section IV highlights the role of technology in these changing practices while. In Section V, methodology of the work is presented while results and analysis are given in Section VI. The paper is concluded in Section VII.

II. Conventional Assessment and Feedback Methods

The assessment and feedback processes can be classified into "*continuous in-term*" and "*end-of-term*" categories [?]. In the remainder of this section, we will describe continuous in-term and end-of-term assessment methods.

A. Continuous Assessments and Feedback

Broadly speaking, there are two key types of the continuous assessments, *formative* and *summative*. Formative assessment,

(also called as "*assessment for learning*"), "provides information about student achievement which allows teaching and learning activities to be changed in response to the needs of the learner and recognises the huge benefits that feedback can have on learning" [?]. Formative assessment on one hand, enables the lecturer to monitor student's progress during the course of a module and provide necessary help to improve and on the other hand, gives opportunities to the student to develop self assessment skills. Through this self-monitoring, (s)he is able to recognise their strengths and weaknesses. Formative assessment methods include impromptu quiz, anonymous voting, short duration paper on a specific subject, silent poll, journal reflection, self-assessment of an oral performance, etc. [?].

Summative assessment (also called as "*assessment of learning*"), involves "making judgements about student's summative achievements for purposes of selection and certification and it also acts as a focus for accountability and certification" [?]. The student's efforts are evaluated at the end of a course against a set criterion and a grade is awarded which is counted towards his final classification. Examples of summative assessment methods include end-of-term/midterm exam, a final project or creative portfolio, end-of-module test, etc.

The use of both formative and summative assessment is necessary to meet the seven principles of good feedback [?] and improve the learning of the student and delivery of the course through feedback. A well designed assessment is therefore, the one that have a mix of both the formative and summative assessments with more emphasis to the formative stages [?]. One important aspect is the effect on continued assessment via class interaction to prepare students for the summative assessments (a form of formative assessment process without formal structure - e.g. delivering in class exercise questions and providing group feedback).

Feedback is a two-way process that serves as a catalyst for the delivery methods and assessment strategies. It is provided to the students/teachers embedded at each of the assessment points as follows:

- Immediate feedback [?], [?] after having group problem solving exercise in the class.
- Instructive feedback [?] incorporating information on the student's work.
- Formative feedback and self-assessment [?] through assignment, quiz and written examination.
- Immediate and formative feedback in supervised laboratory sessions [?].
- Substantive feedback to individual, a group or the entire class through digital dialog [?] using Moodle (a virtual learning environment) Discussion Forum.

Lab-based assessment is an important factor in engineering education. Laboratories play a crucial role in teaching and learning engineering. These are spaces set-up scientifically to provide students with an opportunity to employ their theoretical knowledge in practice and think, discuss, and solve real-world problems. This mode of instructions is reckoned as essential in engineering courses as it delivers the student with a training in observation, prompting the consideration

of details and cultivating curiosity with right tools and skills [**?**]. Students work on practical problems using real scientific instruments and gather their observations. Modern lab-based practicals are also supported by a hybrid approach of software simulations and hardware experiment (such as using MultiSim/PSpice for simulation and Breadboard, battery, oscilloscope and multimeter for experimental verification in an electronic circuit design lab). Assessment of lab-based experiments can take a number of forms including in-session questions, short quiz, lab report, oral presentation and viva voce. The assessment strategy is typically modelled around the core elements of planning, performance and reasoning. A pre-lab/lab/post-lab format is one of the popular ways to conduct a lab-based assessment [**?**].

B. End-of-term Assessments and Feedback

In case of end-of-term assessments, tools such as open book and take-home exams, oral exams, presentations and discussions can be used. All these tools can be grouped in to either individual or group-based assessment and feedback categories. The group-style assessment tools should be designed in such a way that the integrity of the assessment process is not breached. For example, while preparing an examination, questions from a pool of questions of similar levels for different segments of the examination can be included to try and not to give exact same examination questions to all students being examined at one given time.

In order to test students having dissimilar levels of abilities, it is important that the tests are designed to address the challenges risen due to disruptive circumstances and therefore the questions included in these tests should require relatively shorter answers.

III. Assessment and Feedback under Disruptive Circumstances

Unlike the conventional assessment tools and means for formulating and communicating feedback to the students, exceptional circumstances call for a smart combination of both: (i) unconventional methods based on inventive and out-of-the-box approach (ii) some time-tested typical assessment techniques. Several tools can be applied for assessing student's performance and providing constructive feedback including quizzes (take-home or online, real time), assignments, short tests (online real-time), midterm examinations (take home or open-book format), e-poster submissions, research-based tasks and proposal submissions, recorded presentations, active e-class participation, e-discussions and Q&A sessions, summaries (end of session or set deadlines), simulations, peer assessments, short video-based online interviews. These tools can be assessed using different types of grading approaches such as comparing with some pre-defined list, scores or ratings based on whether the desired outcome(s) has been achieved or otherwise. This section discusses challenges and possible solutions in the usage of these tools to assess and provide feedback under COVID-19-like situation.

A. Continuous Assessment and Feedback

Continuous assessment, both formative and summative, is highly desirable but challenging in the the current disruptive environment. Continuous assessment should provide early indications of the performance of students, increase the sense of inclusiveness, provide students with a constant stream of opportunities to prove their mastery of material and send the message that good outcomes can be achieved given enough time and practice.

Online modes of learning prior to the COVID-19 restrictions have mostly been limited to using material uploaded onto virtual learning environments (VLE) to support traditional lectures and submit assignments. Some academics have made use of active or online quizzes, and virtual labs, such as the Virtual programming lab (VPL) available as a Moodle plug-in, to provide both formative and summative continuous assessment. In a short space of time both academic staff and their students have had to consider how to deliver and receive continuous assessment and feedback.

So what needs to be considered to make online continuous assessments effective? Experience during the previous semester shows that there are a number of areas where instructors need to pay special attention and where further consideration is needed:

- As with all teaching and assessment there must be clarity of expectation. This is even more important for remote teaching and assessment, since there will be an increased sense of distance between the lecturer and student. It needs to be realised that there are fewer chances for the priming and micro-communications which happen in a typical classroom setting. An assessment, even if given previously using a VLE, will still have to be re-assessed and modified as clarification can not be given in a typical classroom environment. Ambiguity must be avoided.

- Continuous summative assessments must be valid. Assessment regime must always be based on, and cover the breadth of, the learning outcomes to meet the expected quality assurance standards in marking and moderation. This becomes extremely challenging when it is required to demonstrate engineering skills, which would typically be done in a laboratory or workshop environment. During the initial COVID-19 crisis period this was done with a "light touch", since it has been considered that there have been, or would be, ample opportunities for students to demonstrate these skills on-campus. In practise there now needs to be consideration of how students can meet and demonstrate the learning outcomes related to team working and engineering skill acquisition with limited access to campus facilities, suitable equipment, staff and other students. A VLE can be used to achieve some of these learning outcomes, for example using virtual labs and simulation tools to replicate some of the practical lab based sessions. In addition forums and chats can be used to engage the students in teams. Using these tools to meet these outcomes will require careful design and

an understanding of their limitations.

- The instructor must provide rapid feedback to students. This becomes extremely important in overcoming the sense of remoteness or isolation a student may feel using online learning. The length of time following submission that the students will receive a grade and feedback from a summative assessment should be given and kept to. It should be kept as short as reasonably possible. Students must also be able to receive formative assessment and feedback. This is typically done through the use of virtual office hours, using ZOOM, BigBlueBrother, other video conferencing tools, or via a forum, or by email. It is important to realize that while some students maybe happy to ask questions in an open forum or chat, others will only ask a question anonymously or privately.
- The instructor and student must be competent at using the technology. Whilst training and support for staff in using technology in teaching, and institutional development of online pedagogy is now becoming quite well developed, it is often wrongly assumed that students are comfortable and competent with the technology. A survey carried out at Xi'an Jiaotong Liverpool University in 2019, covering students in Electrical and Electronic Engineering and the Language Centre, found that only 30 percent of students considered their ability to integrate technology during a class to complete a task was good, or better. This highlights the need for students to receive clear instructions, be able to access technical assistance and receive training. This has been done using video demonstrations showing students how to use the technology and any software required for completing assignments. Instruction should include how to submit their assignments via the VLE. There are many pitfalls. For example, a student who has a mac laptop may not find it very easy to run a Windows executable you provide on the VLE.

In the online teaching, it's very important to find out what students most care about. Asking student's feedback about their expectations of the online course, and how they can be best served offers lecturers an opportunity to improve on his teaching and gives students ownership of the process [?].

B. End-of-term Assessment and Feedback

Although we are facing challenging times, it is desirable to run the end-of-term assessments/e-examinations in a controlled environment around the actual schedule to allow students' progress normally with no delays in their careers. It is obvious that students would not be able to come aboard campus to sit their end-of-term assessments physically in a controlled environment for unforeseeable future. Therefore, the need for having an online environment for the same is at peak. Keeping this motive in scene, it is not straightforward to design alternate e-solution(s) for end-of-term assessments/examinations within a controlled environment. An easy approach taken over the past semester by majority of the schools was having 24-hours open-book online/electronic(e)-examinations. Although this seemingly works but it opens-up venues for open-discussions among exam-takers, as well, besides being open-book. Hence, unlimited and undesired peer-to-peer (P2P) learning might take place within this given 24-hours time-window. To overcome/minimise this undesired and unlimited P2P learning during end-of-term assessments, we design the same in light of two major conditions to address and provide a near-controlled environment.
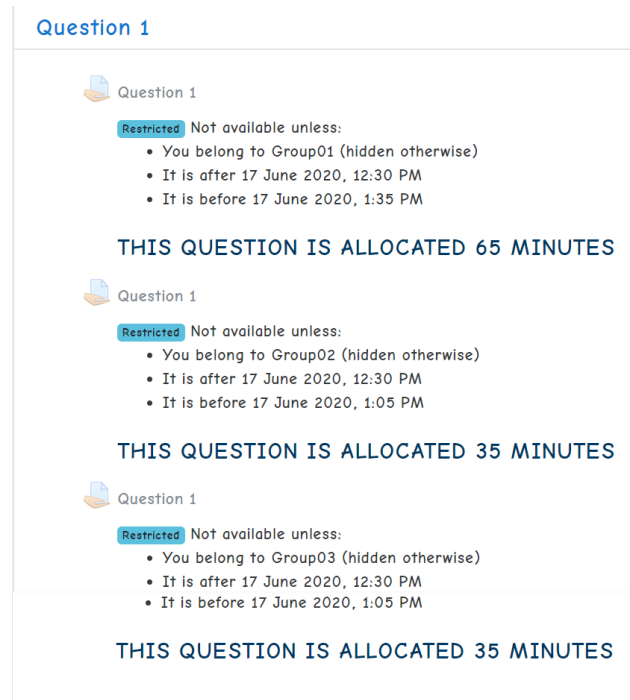

Fig. 1. A screenshot from the four equally timed questions of an end-of-term online assessment depicting the **timed** and **randomised** constraints.

Firstly, we design our online assessments to be strictly **timed**. Specifically, all the questions appear sequentially in a timed manner i.e. each question appears for a given time-window and disables once their allocated duration times-out. Although with this restriction the students' do not have the opportunity to re-visit any particular question, this minimises the undesired effects of P2P learning during the end-of-term online assessments thereby providing a near-controlled environment assessment. We applied this to our scenario as follows. Majority of our courses are standardised in terms of their format i.e. there are four questions in total, each weighting 25% of the total end-of-term assessment. In normal conditions, each of these four questions is designed to be read and solved by the exam-takers in 30 minutes (mins.) thereby totaling the duration of the complete end-of-term assessment to two hours. Hence, the aim with this timing restriction is to allow 30 mins. for each question to be read and solved with an additional 5 mins. for uploading the solution scripts. Once these 35 mins. lapse, the active question times-out and disables. Subsequently, next question appears for the following 35 mins. This leads to a sub-total of 35 mins. per question thereby totaling the complete end-of-term online assessment to 140 mins. or 2 hours and 20 mins. maximum.

We successfully applied this restriction to one course that had three questions (instead of four) as part of its end-of-term assessment/examination with one question contributing towards 50% of the total weight i.e. requiring 60 mins. of duration to read and solve. Hence, note this restriction is equally applicable to any format of end-of-term assessments with respect to number of questions and their independent duration.

Secondly, to further reduce the undesired P2P learning during the end-of-term online assessments, the same questions appear in a ***randomised*** order to the exam-takers. Specifically, a cohort/class-size of 'X' students is divided into at least 'Y' random groups, where Y is defined as the number of questions in an end-of-term assessment. Hence, an end-of-term assessment constituting of four questions has the exam-takers divided into at least four random groups. Although all the random groups ultimately receive the same four questions of the end-of-term assessment, these appear in random order thereby further minimising the undesired P2P learning. Interestingly, the number of random groups can be scaled up to a maximum of X permutations (i.e. $Y = X!$) thereby approaching an almost near-ideal end-of-term online assessment within a controlled environment.

Fig. **??** demonstrates our end-of-term online assessment setup on Moodle in the form of a three questions unequally weighted end-of-term assessment with three random groups. The exam-taker only sees the link to the question that belongs to his/her random group and the group number remains hidden from him. As for the exam-setter, they assign each random group a different actual question within any 'Question X' block.

IV. Role of Technology in Assessment and Feedback under Disruptive Circumstances

Challenges in implementation phase of the assessment tools discussed in previous section need to be well-thought out and therefore meticulously planned for well in advance. For example, tools such as online real-time examination sessions would require stable network connectivity for monitoring and successfully conducting these exams. Therefore, right selection and proper application of assessment and feedback methods is very crucial to the whole process. Similarly, adaptive approach in customizing assessment strategies based on disruptive circumstances can also play a key role in suitability of assessment and feedback tool(s) for obtaining the desired goals. The most important and defining factor for a tool(s) suitability would be the level of effectiveness in providing useful feedback. This can only be achieved if the tools for assessment have been carefully selected, designed and applied. The effectiveness of the feedback phase of the process will also depend on providing near-accurate feedback in a timely and constructive manner. The feedback (about an individual or a group-wise performance) can be given using several means such as:

- Grades that represent some meaningful interpretation e.g. an A means that the assessment outcome was fully met.

- Scores such as percentages that would represent level of achievement or success rate(s).
- Ratings based on classifications such as good, developing, unsatisfactory etc. The performance characteristics being rated can range from something very fundamental to something advanced such as rating the ability of student to use modern software to solve complex engineering problem or to rate the ability of student to apply scientific knowledge for solving problems, etc.
- Worksheet style feedback which would demonstrate conformity to a certain item on the list (representing direct or indirect feedback).
- Detailed interview-style verbal or comprehensive descriptive feedback.
- Surveys designed and conducted to carry out explicit assessments and feedback.
- Digitally marked student worksheets with detailed remarks provided to the student electronically through email or other distance learning solutions.

These methods can be adopted and applied separately or in combination depending on the nature of the subject and the required insight of the feedback.

A. Useful Distance Learning Solutions

During unusual times of disruptive nature, innovative approaches, tools and solutions are needed. Several existing and new distance learning solutions can also be quickly deployed when traditional learning and teaching modes are difficult to apply due to special situations, like COVID-19, which the humanity is facing at present. The list of very useful distance learning resources is very vast, and we refer the interested readers to [**?**] where, information about several resources such as learning management and content creation systems, mobile phone based learning platforms, systems that can be used offline, live communication platform(s) with attendance tracking and video conferencing functionalities and guidance resources for giving psychological support to students, is available.

B. Need for A Holistic Process

It is particularly important not to overlook the general fallout in case of using too many assessment tools, as this could lead to a huge burden on the students and the educator alike. The fact that during disruptive circumstances students will be barraged with inimitable assessment methods in almost all the courses using disruptive measures. This may not only contribute towards student's under-performance due to getting overwhelmed by numerous assessment tools of disparate nature, but also negatively impact the quality and effectiveness of the feedback provided by the educator(s). Therefore, to make the whole process of assessing and providing feedback practical and effective, it is important that the process of selection, customization and application of assessment and feedback tools during challenging times is applied with keeping a comprehensive perspective in cognizance.

One practical solution to tackle this issue could be, to assign course focus group(s), an additional role of keeping a broad oversight not only at course level but at the level of set of courses being taken by student batch. This is mainly to keep number and weightages of assessment and feedback tools applied to every batch in check. Hence ensuring work-ability and quality of assessment and respective feedback(s).

V. METHODOLOGY

To establish the usability of the employed methods for online delivery of the engineering courses under disruptive circumstances, a detailed study was carried out at XXX. It is a transnational education (TNE) program between the XXX and YYY. This program offers three undergraduate engineering courses namely Information Engineering, Communication Engineering and Microelectronics Systems. The program employs 100 plus instructors for the delivery of these courses to more than 2000 students in a block-based model. In this model, each module is condensed in 4 teaching weeks while every two teaching weeks are separated by 3 non-teaching weeks. Under normal circumstances, YYY's campus in ZZZ is used for the teaching activities. The XXX's staff flies to ZZZ to deliver their part of the teaching.

After the outbreak of COVID-19, all of the on-campus academic activities at YYY were suspended affecting the Spring 2020 semester. An online mode of content delivery is therefore, adopted to mitigate these effects and support continuous learning of the students. Learning material was uploaded on Moodle. Lectures were segmented into 4-5 sub-topics and each sub-topic was discussed in a 8-10 minutes long video (with a size of <100 MB) to retain student attention as well as meet internet download speed limitations. The lectures were uploaded adhering to the block-based timetable. Each teaching week was followed by two webinars providing the students with an opportunity to ask live questions and discuss problems regarding the lecture content. Laboratory experiments were also updated to enable the students perform the exercises online using software and simulation-based tools. The lab sessions were conducted during the time-tabled slots and a dedicated team of teaching assistants were available online to provide student support. Online submission, electronic marking of the lab reports and course work and transmittal of feedback through Moodle was employed.

The students from all four years of study were engaged in an online survey having a number of questions to provide their feedback and reflect upon this online mode of teaching delivery. Reflection of the staff teaching during the semester on online teaching experience and student engagement was also sought through focus group discussions steered via a set of questions.

VI. RESULTS AND DISCUSSION

The results of the study are presented in this section. Recommendations are also made based on the analysis and discussion of the results.
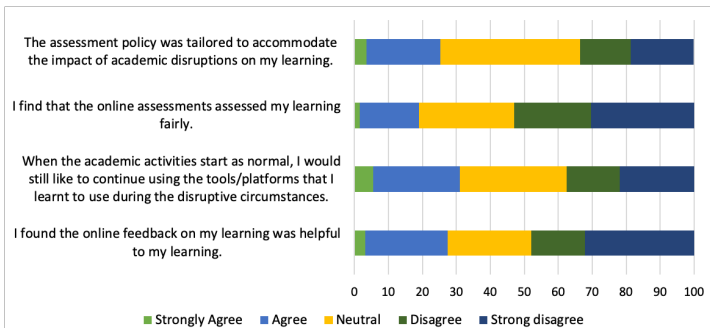

Fig. 2. Quantitative results of the student survey.

A. Student Survey Results

Students from all four cohorts (belonging to each of the degree year) of electronics and electrical engineering program at XXX were involved in the survey. The survey consists of both the quantitative and qualitative questions asking the participants' views on different aspects of online delivery and engagement. Out of 1750 enrolled students, 206 students responded to the survey questions resulting in a response rate of 12%. Though having a relatively low response rate, the sampled pole was representative for a student population of 2000 as it fulfils the requirement of 1% response rate for 10% sampling error and a confidence level of 80% [?] providing sufficient accuracy.

1) Quantitative Feedback: The participants were asked to provide their feedback on the following questions regarding quality of online assessment, clarity of the assessment brief, level of engagement and usability of the feedback offered through the online delivery using 5-point Likert scale (strongly disagree, disagree, neutral, agree and strongly agree).

1) I found that the online assessments assessed my learning fairly.
2) I found the online feedback helpful to my learning.
3) When the academic activities start as normal, I would still like to continue using the tools/platforms that I learnt to use during the disruptive circumstances.
4) The assessment policy was tailored to accommodate the impact of academic disruptions on my learning.

The quantitative results are illustrated using a clustered data chart shown in Fig. **??**. The results are a clear indication of student's discontent to the online assessment and feedback as only a small percentage agreed/strongly agreed to all of the questions asked. A mere 19% respondents believed in the ability of online assessments to fairly assess their learning. Nearly 27% respondents found the online feedback helpful to their learning. Around 25% agreed/strongly agreed to the statement that the assessment policy was tailored to accommodate the impact of academic disruptions on their learning.

This low acceptance rate of the online assessment and feedback practices is fairly explainable. Engineering courses are rich in mathematical content that require specialised tools to replicate the numerical solutions on white board in an online setting. A video-only based Powerpoint is therefore,

not helpful in the delivery of such concepts. Laboratory based assessments are rich in experimental work and hardware equipment usage. A software simulation is unable to provide the students with that rich experience of hands-on use of the instruments and observation of real-world problems. Assignments in engineering courses are typically a blend of numerical design and experimental work. Use of the video lectures, Moodle assignment briefs and software simulations again fail to explain the difficult concepts and mathematical derivations and unable to provide firsthand experience of component use.

While having a low overall acceptance rate, online assessment and feedback do have some encouraging bits. Around 31% of the students agreed/strongly agreed that they would like to continue using the tools/platforms in normal circumstances that they learnt during the COVID-19 period.

2) Qualitative Feedback: The students were also asked some open-ended questions to capture qualitative feedback. The questions along with the summary of the responses are given below.

Q: Please mention the strongest points of the online assessment and feedback experience in this semester.

In response to this question, most of the students were positive to the fact that they had freedom of using electronic submissions. They liked the fact that they can play the videos repeatedly to understand the topics. The students appreciated availability of more material, relaxed home environment, "*less stressful and easier to prepare*" and "*more freedom in time arrangements*". Improvement of "*self-study skills*" and "*independent learning ability*" are also identified as the strong points of the online assessment.

Q: Please mention the weakest points of the online assessment and feedback experience in this semester.

This question has gathered some very interesting responses highlighting burning issues with online assessment and feedback which are equally applicable to the whole of the online delivery mechanism. Problems surfacing from poor internet connectivity, plagiarism and unavailability of immediate feedback are commonly stated. Students also pointed out "*lacking of a sense of a direct involvement*" and ' "*difficulty of communication when doing group discussion and interaction with audience when doing presentation*". Online assessments are also noted to be '"*not real-time*". Another weakness of this mode is identified to be difficulties in asking questions and getting answers quick.

Q: Which communication tools/learning platforms did you use during the online assessments?

The most widely used platforms appeared to be Zoom, Tencent classroom, and Moodle. Tencent QQ, a Chinese tool for social interactions, Wechat and Webots also got a mention. Matlab and LTSpice are identified as a key simulator for circuit design. The popularity of the social networking platforms indicate the student's reliance on peer support in online assessments due to restricted real-time access to the instructors/teaching assistants and unavailability of physical lab instruments.

Q: What new skills have you developed as a result of the online assessments?

In response to this question, overwhelming majority of the students mentioned improved ability of self-study. "*I know how to learn without any help from others*" and "*how to learn by myself*" are some of the answers. One student stated "*fixing network problems*" as one of the acquired skills. The respondents also mentioned "*the skills of using online communication tools more effectively*" and "*improved communication skills greatly via social media platforms*". Time management also got a nod. Improved learning of simulation software including Matlab, LTSpice, Webots and Python is also highlighted as a positive outcome of the online assessments.

B. Staff Focus Group Findings

Focus group discussions were also conducted as part of this study. These focus groups consisted of 15 academic staff members involved in online course delivery during the Summer 2020 semester affected by the COVID-19 lockdown situation. Findings of these discussions are summarised below.

Q: How much experience of online assessments did you have before the current semester?

The staff experience with online assessments was found to be limited. While majority of the staff members did use VLEs including Moodle and Blackboard to facilitate electronic submission of lab reports and course work, only few had used online assessments in the form of MCQ tests, short-answer quizzes and mobile polls.

Q: What was your main challenge with regard to online assessments?

The staff identified the student engagement as one of the major challenging tasks in online assessments. Communicating the tasks and required outputs effectively also found to be difficult occasionally due to limited interaction. Availability of specialized software/tools for personal usage can also be a problem as most of the education software are expensive and licensed for on-campus usage while free-to-use software have limited functionalities. Remote access of campus-licensed software by a bulk of students simultaneously can bottleneck the network slowing down the simulations while issues with technology infrastructure and poor internet connectivity can affect the student progress and timely submissions of assessments. Moreover, student's awareness/ability/desire to use and adapt to the new means of assessment is also an issue in some cases. It was mentioned that creating a group working environment in which students can collaborate on various tasks and assessing their group work is also not easy without on ground student performance indicators.

Q: What aspect of your assessment did you enjoy the most?

The staff recognised flexibility and liberty of using multiple online tools as one of the most enjoyable feature of online assessments. It is noted that use of some assessments types such as MCQs and lab quizzes can significantly reduce the marking effort and provides with an opportunity to dedicate more time to enhanced student experience and effective feedback.

Q: What suggestions do you have to improve online assessment for future courses?

The staff voiced for the need of added time, resources and training options making them aware of best practices and procedures for online assessment. It was alos suggested for the institutions to arrange, provide, negotiate and ensure special packages by internet service providers for students to cope with connectivity issues at critical times such as during exam(s). A uniform rubric, larger number of interactive sessions and increased mid-semester tests are identified as means to enhance the student engagement and progress.

Q: In what ways did the transition to online assessment and feedback impact on your normal/previous working practices?

Staff mentioned increased work-load due to developing course materials (lectures, assessment, worksheets, feedback forms, etc.), integrating self-assessment tasks in lectures, and learning use of new technologies that left less time for reflection. Online lab sessions, assessments and marking have also increased the dependency on teaching assistants that affects the quality of feedback. Although, online mode offers more flexibility, some task off-loading was reckoned necessary to make the mode sustainable.

Q: Do you feel you were given an appropriate amount of time to make the changes you needed to transition to online assessment?

In response to this question, while stating quick transition and less preparation time, the staff recognised that it was a response to the need of the hour as "*we are now living in not normal time*". It was also noted that TNE program was slightly better prepared and proactive than local UK programs.

Q: Can you identify any ways in which you have developed professionally during this transition to online assessment? Please give details.

The staff perceived that the transition to online mode of assessment has provided them with good level professional development. It came up with the opportunity to learn new technologies including online meeting systems, new simulation and content building software and e-marking tools. Commenting on the tight schedules and high work load, a staff member stated, "*I think it has been a roller coaster ride and I am now well prepared to work in challenging, high pressure environments as very few scenario can top this experience*". Incorporation of more self-assessment/home-work as part of video lecture series was also mentioned as a new learning experience.

C. Recommendations

A set of recommendations is presented based on the quantitative and qualitative data collected from both staff and students. These recommendations will be useful in devising effective future online assessment and feedback strategies under disruptive circumstances.

- Online assessment relies heavily on student engagement that can be enhanced through use of increased number of formative assessment points and a structured feedback.
- Technology such as internet connectivity, VLE, simulation software and e-marking tools are pivotal to the success of online assessment. A careful consideration and well-ahead preparation should be carried out on the selection, availability and usability of these components.
- Good learning and training opportunities should be provided to both the staff and students to make them comfortable in the use of new technologies as part of the course assessment.
- Sufficient time should be given to the teaching staff to develop effective and well-tested online assessment strategies.
- IT support should play a more pro-active role to facilitate not only the provision of necessary software and hardware but also training and help on assessment set-up.
- A due recognition should be given to the teaching staff for their efforts to learn new techniques, improve their methods, enhance the content and support the students in disruptive circumstances.
- An efficient assessment should incorporate effective means to counter plagiarism and use a uniform rubric for different student groups. Marking, supported by teaching assistants, should also be solicited effectively to offer a fair treatment across the board.

We hope that these requirements would not only improve the quality of the online assessment and feedback but also enhance the student experience in disruptive environment.

VII. CONCLUSION

Online teaching is here to stay and would probably be the preferred mode of delivery in the wake of COVID-19. Assessment and feedback is the lifeline of teaching and online mode is no different. This paper has briefly highlighted the methods of assessment and feedback in a conventional setting. A detailed discussion has then been carried out on online assessment and feedback techniques under the disruptive circumstances in transnational higher education. Effectiveness of these methods has been critically analysed through a quantitative and qualitative study involving both staff and student of an engineering course. It appeared that technology is the backbone of online assessment and its effective use is necessary to enhance the student engagement and learning. A blend of formative, summative and lab-based assessments along with timely feedback not only improves the quality of online teaching but also enhances the student learning.

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