

Short Reflection and Observation Report

Adapting examination and student evaluation at Biomedical Science Institute in the time of COVID-19

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Abstract: As COVID-19 pandemic spreads worldwide, universities and academic institutions were forced to shift their face-to-face education to online learning since spring 2020. This shift was termed “emergency remote education or learning”, caused many distractions to students, and posed many challenges for both assessment and examination systems and practices at our Zhejiang University-University of Edinburgh (ZJU-UoE) Biomedical Science Institute, like other educational institutions worldwide. This necessitated the development of alternative and effective approaches and procedures to teach students, and several changes and adaptations of assessments and examinations at ZJU-UoE institute. In this article, we described the implications of the COVID-19 pandemic for student assessment systems and practices at ZJU-UoE Institute. The article is particularly reflecting on alternative approaches and strategies that we have developed at ZJU-UoE institute to change and adapt student assessments and examinations during COVID-19 pandemic. These changes involved developing general examination strategies and settings, including online (MCQ-type) test exam settings and online written exam settings, and developing effective procedure and policy to safeguard academic integrity during the COVID-19 pandemic that can help with facing various education and learning challenges in a time of crisis worldwide.

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Abbreviations:

MCQ: multiple choice question

SAQ: short answer question

ZJU-UoE: Zhejiang University-University of Edinburgh joint college of biomedicine

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1. Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic is a “Global Event” (Ingram, 2019)[1] that has abruptly and drastically changed the global higher education landscape, leading to remarkable cuts in the normal life of a wide range of higher education institutions worldwide. The COVID-19 pandemic has had major implications on higher education students, affecting over 1.5 billion students and learners in almost 200 countries worldwide (Pokhrel and Chhetri, 2021)[2]. The COVID-19 pandemic-related effects on the higher education include both the mental and physical well-being of students and learners, and the cancellation of on-campus events that extended to 96% universities in USA and 97% universities in Europe (Kercher and Plasa, 2020; El-Hashash, 2021a)[3,4].

At Zhejiang University-University of Edinburgh joint college of biomedicine (ZJU-UoE institute), we have turned our sights to virtuality to ensure the continuity of our teaching-learning process early in 2020, and then to the hybrid learning in the first semester of the academic year 2020-2021 from September 2020 and till now. Online, hybrid and face-to-face are well-developed learning programs at ZJU-UoE institute. These learning programs are well-equipped with more efficient mechanisms for ZJUE-UoE

lecturers to assess, evaluate and provide clear feedback and formative guidance to ZJU-UoE students (El-Hashash, 2021a)[4].

The COVID-19 pandemic has remarkably impacted both teaching and learning at higher education institutions worldwide. The pandemic has created many challenges for both assessment systems and practices at ZJU-UoE institute, and other higher educational institutions worldwide (Pokhrel and Chhetri, 2021)[2], including challenges in maintaining student achievements and skills and other challenges for teachers at ZJU-UoE institute (El-Hashash, 2021a)[4]. In addition, ZJU-UoE institute and most higher education institutions worldwide have been forced to alter planned curricula and both assessment setting and planning.

This article discusses the implications of the COVID-19 pandemic for student assessment systems and practices at our biomedical research institute. The article is particularly reflecting on alternative approaches and strategies that we have developed at ZJU-UoE institute to change and adapt student assessments and examinations during COVID-19 pandemic that can help with facing various education and learning challenges in a time of crisis worldwide.

2. Assessment of Student Learning

Assessment of student learning refers to various strategies that are designed for confirming what students know, or demonstrating whether or not students have met the outcome(s) of the curriculum or the goal(s) of their individualized programs (Earl and Katz, 2006)[5]. Both the assessment and monitoring of student learning can provide information to lecturers about the current knowledge and progress of higher education students. They are, therefore, crucial and essential processes aiming to gather, evaluate and process information on student knowledge and understanding and what lecturers can do to make informed decisions on the improvement of student education (Clarke, 2012)[6]. Notably, the assessment and monitoring of student learning should take account of both teaching and learning principals, students' needs, and the environment in which the teaching course(s) will be used (Vaccaro and Sabella, 2018; Zeng et al., 2018)[7,8]. Major methods of student assessments in biomedical science education have been recently reviewed (El-Hashash, 2019a, 2020)[9,10].

Careful observations of student learning and suggested changes to their teaching courses and the way they are run can facilitate proper assessment and monitoring of student learning that will eventually help students with getting the most benefit from their teaching courses (Vaccaro and Sabella, 2018; Zeng et al., 2018)[7,8]. Student assessment and monitoring can be achieved through several methods that include learning's observation, student self-assessment, diagnostic assessment, and short-term achievement assessment. A careful observation of student learning can help with determining whether some changes are needed to the learning activities of students. This can be achieved through several methods such as observing student laboratory notebooks and their small group discussions that can encourage and promote student learning. In the student self-assessment method, students work with checklists or scales to identify their obvious areas of weakness or strength, while the diagnostic assessment method can help students to determine the gaps in their knowledge, what goes into a course, and how to improve their teaching course(s). Short-term achievement assessments can, particularly, determine whether students are making a short-term progress and enhance student motivation (Vaccaro and Sabella, 2018; Zeng et al., 2018; El-Hashash, 2021a)[4,7,8].

3. COVID-19 Pandemic: Implications for Assessment Systems and Practices at ZJU-UoE Institute

Like other higher education institutions, both examinations and in-course assessments are used at ZJU-UoE institute to generate the final mark for the course for

students. Assessments are either summative or formative. Summative assessments can contribute to the final course mark, while formative assessments do not contribute to the final course mark at ZJU-UoE institute. Summative assessments have a high point value and contribute to the final student course mark at ZJU-UoE institute. They are used to both provide a mark and feedback that helps students to improve their learning performance and determine whether students have achieved the course learning outcomes. Conversely, formative assessments are used to determine and monitor student understanding, skill and learning at ZJU-UoE institute. They can provide feedback to students and, therefore, help with improving their understanding, skills and learning performance (El-Hashash, 2021a)[4].

Prior to the COVID-19 pandemic, almost all modalities of learning assessments were dependent on students' physical presence at global higher education institutions, including ZJU-UoE institute. During the pandemic, ZJU-UoE institute and many higher education institutions worldwide had to shift from regular face-to-face to emergency remote education. Students at ZJU-UoE and other higher education institutions were forced during the pandemic to study online, with limited access to the university facilities and less contact with lecturers and classmates/peers, while being exposed to more autonomy at the same time (Pokhrel and Chhetri, 2021; El-Hashash, 2021a)[2,4].

During the COVID-19 pandemic, higher education institutions have been pushed to conduct digital teaching and learning and forced to alter planned curricula and both assessment setting and planning. However, these changes were challenging at ZJU-UoE and other higher education institutions since it was difficult to monitor student learning and know how they are learning. There was also difficulty in ascertaining whether there is a gap between the expected progress and actual learning of higher education students (Pokhrel and Chhetri, 2021; El-Hashash, 2021a)[2,4].

In sum, the COVID-19 pandemic has remarkably impacted teaching and learning and created many challenges for the assessment systems and practices at ZJU-UoE institute (El-Hashash, 2021a)[4] and other global higher education institutions (Pokhrel and Chhetri, 2021)[2]. These challenges have been recently reviewed at ZJU-UoE institute (El-Hashash, 2021a)[4] and are briefly described below.

3.1. Challenges for Instructors at ZJU-UoE Institute

ZJU-UoE lecturers have faced several challenges due to the shift in the course delivery during the pandemic. Both remote online delivery and assessment of students, for example, were novel experiences for several new teaching faculty and junior faculty at ZJU-UoE. Moreover, new blended and hybrid learning strategies and protocols require lecturers to have sufficient digital competences and experience in implementing appropriate monitoring and assessment practices for students. Several lectures, particularly junior and new faculty, did not have such sufficient competences and experience. These new blended/hybrid learning strategies and protocols also require lecturers to make rapid changes in their daily tasks, practices, and responsibilities, and have the skills of developing new alternative approaches that can facilitate the monitoring of student learning, which were obvious challenges for many lectures and junior faculty during the pandemic (El-Hashash, 2021a)[4].

In both online and on-site learning environments, higher education students have a considerable amount of autonomy (Biber et al., 2021)[11]. Lecturers at higher education institutions, including ZJU-UoE, have faced many challenges such as reduced amount of time, which is allocated to lecturer-directed learning, by focusing on more student self-learning in teaching courses, and limited available data of large-scale assessments that remarkably affected the monitoring process of student performance during the pandemic. Other major concerns and challenges for lecturers during the pandemic were on determining whether students are making the expected progress and how to evaluate this progress, and whether there is a gap between learning expectations and actual learning of

students. The limited relevant training and resources on digital learning platforms for lectures who worked from home also added more challenges during the COVID-19 pandemic. Furthermore, both research and teaching faculty were not able to supervise the research projects of students or run their own research during the pandemic (El-Hashash, 2021a)[4].

3.2. Other Challenges for ZJU-UoE Institute

Changes in student education and assessment were rapid at higher education institutions worldwide, including ZJU-UoE, during the COVID-19 pandemic (Kercher and Plasa, 2020; Reimers et al., 2020; Gamage et al., 2020; Goris, 2020; Barron et al., 2021; Mok et al., 2021; El-Hashash, 2021a)[3,5,12-16]. The COVID-19 pandemic-related shift in learning and assessment culture for students and lecturers has created several challenges in the evaluation/assessment of student progress at ZJU-UoE institute and other higher education institutions, including the needed resources to assess student learning through non-traditional channels such digital platforms.

The pandemic has also had clear impacts on the international student mobility and learning at ZJU-UoE, similar to other higher education institutions (Goris, 2020; Kercher and Plasa, 2020)[3,14]. It is particularly critical to have learning equity between students (Sammons, 2010; ECD, 2008)[17,18] and, therefore, the COVID-19 pandemic-related pressure to deliver various assessment and examination types must not set aside equity considerations between students. Consequently, ZJU-UoE institute has paid attention to more equity considerations in learning and assessment between on-campus and off-campus students during the pandemic (El-Hashash, 2021a)[4].

4. Changes and Adaptions of Assessments and Examinations during COVID-19 at ZJU-UoE Institute

The need for changing student assessments at educational institutions is not new, and has been raised before (Care and Vista, 2017)[19]. Lecturers should pursue dynamic pedagogies and have a plan for modelling 21st century skills, and their newly designed assessments should reflect the nature of these 21st century skills (Care and Vista, 2017)[19]. Consistent with 21st Century learning and advancement of assessment tools, student assessments are becoming more student-centric, offering lectures the opportunity to improve learning and make it more personal for the individual student (Goble, 2021)[20]. A vision for the assessment of students in 21st Century involves a shift to assessment of student learning, including a continued shift towards formative assessment, a shift from traditional grading to standards-based grading, a shift to more actionable assessment data, a shift from end-of-level testing to alternatives, and a shift towards better assessment technology (Goble, 2021)[20].

The general goal of student assessments is the evaluation of student knowledge adequacy with standardization (Mujeeb et al., 2010; Schuwirth and van der Vleuten, 2011; Kurtz et al., 2019; El-Hashash, 2019b)[21-24]. Developing and delivering effective assessments are essential since assessments are very important learning tools for determining the fulfilment of student learning (Zaidi et al., 2018; Kurtz et al., 2019)[23,25]. Both written and practical examinations are assessment methods currently used for the evaluation of the skill performance, attitude, and cognition of both medical and biomedical science students (Schuwirth and van der Vleuten, 2004)[26]. The most used written examinations in medical and biomedical science institutes are short answer questions (SAQs) and multiple-choice questions (MCQs; El-Hashash, 2020)[10].

The COVID-19 pandemic has a remarkable impact on student assessment and learning at educational institutions worldwide (Pokhrel and Chhetri, 2021)[2], including ZJU-UoE institute (El-Hashash, 2021a)[4]. This, accordingly, has necessitated the development of alternative and effective strategies and approaches for student assessments and examinations at ZJU-UoE institute. These alternative approaches were

used to assess student learning and practice and ensure equity in assessment between on-campus and off-campus students during the pandemic (El-Hashash, 2021a)[4], and will be discussed in detail below.

4.1. General Examination Strategies and Settings

During the COVID-19 pandemic, all students took the same examinations and assessments at ZJU-UoE institute regardless of whether they are on-campus or off-campus. In teaching courses with both on-campus (on-site) and off-campus students, the examination was an online open-book examination, in which the students were free to use any physical materials (e.g., a textbook) or online materials (e.g., the internet and online course materials) during the examination. These online examinations were delivered through Blackboard Learn that is the primary learning management system at ZJU-UoE institute.

In courses with on-campus students only at ZJU-UoE institute, the examination was a closed-book examination, where the students cannot use any materials during the examination. On-campus students were able to sit the examination in an examination room under examination conditions regardless of whether it is a closed-book examination or open-book examination. The format of the examination was either an online format or the traditional format (i.e., pen and paper).

High education students can experience high stress level due to several reasons, including the style of their study and lack of needed information and/or appropriate preparation. When perceiving negatively or becoming excessive, stress can lead to anxiety before and during examinations that will ultimately affect student academic performance and achievement (Kumari and Jain, 2014; Roussos, 2018)[27,28]. A correlation between examination stress and anxiety of high education students has been reported (Kumari and Jain, 2014)[27].

Since taking exams online was a new and potentially stressful experience for many ZJU-UoE students, guidelines prepared by the program director and the course organizers were sent to both on-campus (on-site) and off-campus students to help with their preparation for the examination and how to best use online exams to avoid additional stress while maintaining academic rigor. For example, students were instructed to sit the examination alone (i.e., not in physical groups or collude online using social media apps) during the examination. They were also advised to be prepared for the start of the exam (e.g., tablet/laptop computers are fully charged and connected to the internet, have a pen and paper to hand... etc).

4.2. Online (MCQ-Type) Test Exam Settings

Multiple choice question (MCQ)-based examinations, which are consistent with educational outcomes, can be effectively used for the assessment of many aspects of student performance. They are also effective tools in facilitating timely feedback and contributing to the process of student self-learning (Brady, 2005)[29]. In addition, weekly and online MCQ quizzes can enhance student performance (Geist and Soehren, 1997; Ballard and Johnson, 2004; Gholami and Moghaddam, 2013; Culbert, 2020; El-Hashash, 2021b)[30-34].

During the COVID-19 pandemic, summative end-of-semester MCQ exams were delivered to students online through Blackboard Learn at ZJU-UoE institute. In each exam, students were asked to attempt to answer several MCQs. The MCQs a given student sees were randomized from a bank of questions on Blackboard Learn, and students were asked to attempt to answers all questions. For each MCQ, the answer option order was also be randomized to make the exam a student sit be slightly different to the exam other student classmates will sit. The randomization of both the MCQs and the order of answer options aimed to make it more difficult for students to collude and/or cheat during the exam, but without introducing an advantage or disadvantage to a given

student. Students were asked to complete the exam within two hours since the answers will be automatically submitted two hours after student begins the exam, even if he or she has not answered all the questions.

4.3. Online Written Exam Settings

Student-written exams are commonly used as innovative approaches to learning and evaluation (Corrigan and Craciun, 2013)[35], and can enhance student involvement (Weimer, 2015)[36]. During the COVID-19 pandemic, summative end-of-semester written exams were delivered to students online through Blackboard Learn at ZJU-UoE institute. The PDF exam paper(s) was posted in a clearly labelled folder and was available only during of the exam time. Each course organizer provided clear marking criteria, guidance, and exam instructions for their exam. Each student was advised to write the answers to all questions in a single Word file and name the file with his/her anonymous exam number and the name of the course using a legible English font and font size.

Students had the option to include hand-drawn figures in their submissions. Each figure should be signed with student's name and photographed using a smartphone before embedding into the Word document containing the answers to Exam questions. Downloaded figures from the course materials or any other source(s) were not acceptable and were considered as plagiarism at ZJU-UoE institute. In addition, students were advised to save their work regularly during the exam by enabling the 'auto-save' feature of the word-processing program(s) they are using to save their Word document every few minutes. Students were also strongly advised to make a back-up file each time they save, either in the 'cloud' or on an external drive, and preferably both. After finishing writing their answers, students were asked to submit only one Word file in each exam (containing the answers to all the exam questions) in a clearly labeled drop box for exam answer submissions on Blackboard Learn. Importantly, students were also advised to keep a copy of their submitted Word file in a safe place for any future inquiry.

5. Safeguarding Academic Integrity at ZJU-UoE Institute during COVID-19 Pandemic

Both remote learning and online learning have significant effects on higher education during COVID-19 pandemic. However, they have created a pressure on undergraduate and postgraduate students to complete their study curricula and prepare for various assessments, the benchmark and/or the year-end examination(s) in a short period of time (Gamage et al., 2020)[13]. Arrangements for academic examinations and maintaining the proper academic integrity were challenging during the COVID-19 pandemic.

The academic integrity has been defined as "a commitment, even in the face of adversity, to six fundamental values: honesty, trust, fairness, respect, responsibility, and courage" by the International Center for Academic Integrity (ICAI, 2014)[37]. Various academic examinations and assessments require a strictly controlled invigilation procedure and, therefore, cannot be conducted online during the pandemic. Maintaining academic integrity during the COVID-19 when undergraduate students were not physically in the classroom was, therefore, difficult and challenging (Gamage et al., 2020)[13].

The shift to online instructions during COVID-19 pandemic has created many difficulties and global challenges in the detection of cheating during online delivery at educational institutions and universities and, therefore, it influences the assessment security and safeguarding of academic integrity (El-Hashash, 2021a)[4]. The invigilated examinations and assessments are generally more secure. However, they were not an option or easily available in the time of COVID-19 pandemic.

We have maintained the academic integrity at ZJU-UoE institute during the COVID-19 pandemic by applying successful and strictly controlled practices to detect cheats in online student examinations/ assessment and safeguard academic integrity in digital domain. We used several practices at ZJU-UoE institute such as the use of online

software(s) and “high-technology” tools for detecting plagiarism and academic misconducts, respectively (El-Hashash, 2021a)[4]. Indeed, the use of Turnitin, a web-based plagiarism checker and prevention system, was successful in supporting academic work integrity since it helped with checking for any plagiarism at ZJU-UoE institute. We also used other practices such as disseminating information to ZJU-UoE teachers on the policy of academic integrity, and how to design “low-stake” assessment tasks. In addition, ZJU-UoE teachers received instructions on how to apply innovative assessment design strategies that can help with mitigating student academic misconducts during remote learning and/or online delivery. These innovative assessments integrated a variety of techniques and methods and were carefully designed to be flexible and adaptable to various approaches and contexts that helped with overwhelming the COVID-19 impacts on academic learning (El-Hashash, 2021a)[4].

Students were given clear instructions about academic misconduct/dishonesty, including its rules and how to avoid it at ZJU-UoE institute. Students were told that examinations are used as an assessment of an individual’s understanding and knowledge and, therefore, they should not collude with other students during each examination or assessment. Indeed, collusion is an offence under ZJU-UoE academic misconduct rules for students, who may be penalized if they are found to have colluded with others. Similarly, cheating is an extremely serious offence at ZJU-UoE institute. Students were instructed to not make use of any unfair means in any assessment or examination. Cheating or attempting to cheat in an examination can lead to student failure in this examination. Furthermore, students were advised not to impersonate other students, i.e., not to take the identity of another student with the intent to deceive. Impersonation is another offence under ZJU-UoE academic misconduct rules for students.

6. Summary and Conclusion

Universities and academic institutions worldwide had shifted their face-to-face education to online learning in response to the COVID-19 pandemic since spring 2020. The sudden changes to online education was termed “emergency remote education or learning” (Hodges et al., 2020)[38]. The emergency remote education or learning has caused many distractions to students, including online study alone, anxiety and stress (Son et al., 2020)[39], and posed many challenges to student examinations and assessments. This has necessitated the development of alternative and effective approaches and procedures to teach students, and several changes and adaptations of assessments and examinations at ZJU-UoE institute. These changes involved developing general examination strategies and settings, including online (MCQ-type) test exam settings and online written exam settings, and developing effective procedure and policy to safeguard academic integrity during the COVID-19 pandemic that are described in this article.

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