Student Engagement in Digital Education

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Table of Contents

I. Background

Is Education Broken, Can We Fix it?

The education system has been increasingly critiqued throughout the last years, and the Covid-19 crisis appears to have made matters worse (Moore, 2021). The outbreak of Covid-19 was declared a pandemic by the World Health Organization in March 2020 (McNeil Jr., 2020). Up until a year after the pandemic, everyday life as we knew is still disrupted and heavily impacted. Various parts of higher education were affected as well, completely changing the learning experience. As governments started to implement social distancing rules to curb the spread of the virus (Crawford et al., 2020), teaching as normal could no longer continue. Universities worldwide had to rapidly scale up their online teaching modes to accommodate the new regulations (Burki, 2020). As Wong (2020) states: "schools could solely conduct teaching through the internet and students could only reply on computers to access learning. This educational scenario was unprecedented" (p.1). More than a year after the initial outbreaks in Europe, an increasing amount of data has revealed the effects of the disruption in the education system. While overall pre-existing trends appear to have been speeded up, most education institutions did not change or develop their online education tools significantly after the initial move online. For universities, this shift to online education was primarily focused on transitioning the contents and teaching, leaving online pedagogy, social and informal parts of learning relatively unattended (Crawford et al., 2020). Various online platforms were utilised to enable interactions between teachers and students (Gonzalez et al., 2020) and facilitate higher education during the pandemic. In-person pre-Covid teaching was shaped by synchronous interaction (Watts, 2016), on the other hand, Kümmel et al. (2020) described that: "learning in digital learning environments is characterised by the provision of learning materials that are

independent of time and location, and by broad access to learning materials" (p. 1). This great potential for learning outcomes through flexibility for time zones and locations enables better accessibility earning materials, decentralisation from a single educational place, interactivity, and individuality and customisation (Arkorful & Abaidoo, 2014). The ongoing Covid-19 pandemic emphasised the pre-Covid prevalent digital shortcomings, especially in terms of the mentioned social, informal and engagement aspects (Chaku et al., 2021; Daumiller et al., 2021).

The Pre-Pandemic Educational Landscape

The Covid-19 crisis speeded up digital developments and forced universities to move all teaching online and leverage digital tools almost overnight (Burki, 2020). In summer 2020, the Guardian published an article titled: "Our school systems are broken. Let's grab this chance to remake them." (Moore, 2021). History has shown that crises enhance the saliency of previously existing problems following partly from an added time pressure (Powell, 2010; Rosa, 2013). The same proved to be true for the ongoing Covid-19 pandemic (Bradley et al., 2020). Education was facing digitalisation problems before the pandemic, and the sudden shift to completely remote teaching has emphasised the discussion on these shortcomings (Bao, 2020; Doyumgaç et al., 2021; Kebritchi et al. 2017). In the last few decades, technological advancement has significantly impacted teaching practices (Akbar, 2016). Digital teaching methods and online courses ⌷became increasingly popular (D'Amico, 2019). Despite the shift to digital education, digital adoption in the sector was moving slowly, and social, well-being and identity effects became a problem in online education. Several studies found a significant decrease in student satisfaction and engagement with their university, peers, and program and decreased overall happiness through the recent shift to digital practices (DAAD, 2020; Office for National Statistics, 2020;

WeWork & Brightspot strategy, 2021). These results are linked with the missing social aspects connected to studying in an offline environment. As traditional online platforms were not developed to replace physical teaching completely, educators are now increasingly faced with the challenge of implementing changes to increase online student engagement and performance outside the typical classroom and teaching practices. While overall pre-existing trends appear to speed up, most major education institutions did not change or develop their digital education approach after the initial move online. As they have not developed much, there is much potential for improvement. The world is becoming increasingly digitalised, so education needs to adapt and conform to this digitalisation (Kümmel et al., 2020).

II. Introduction

By introducing psychological, social, and pedagogical thinking, it is possible to build an "organic web of interactions" (Teräs et al., 2020) for students, teachers, professors, and institutions (Oztok et al., 2014). This essay tries to foster more engaging, collaborative and effective learning environments from a student-led perspective incorporating all stakeholders relevant to student online education. As Rovai (2002) already established two decades ago, "distance education is becoming a mainstream instructional delivery system for post-secondary courses and degree programs." (p.319). Following this development, it is increasingly important to consider student engagement wherefore this essay focuses on four factors critical for student engagement (Pino-James, 2015, 2017). The relevant factors include support for student agency and the development of student competence as well as promotion of positive peer and student-teacher relationships.

In recent years significant trends emerged within the educational field emphasising the future role of decentralised learning (E.g., Coursera or Edx), web-based courses, virtual-reality (VR), gamification and more integrated collaborative learning. This essay recognises through psychological and pedagogical research the importance of peer interaction and informal interaction for the learning process (George & Labas, 2008). While digital tools offer diverse benefits, the crisis emphasised underlying problems in digital teaching (Doyumgaç et al., 2021).

Outlook

This essay explores current research on digital higher education, including underlying problems currently highlighted by the ongoing Covid-19 pandemic (see Figure 1). Coming from a student-led perspective on the issue, this essay strongly emphasises previous research and delineates the problem of student disengagement. To understand the lack of engagement, it analyses the shortcomings of the current online educational approach by leveraging Installation Theory and further establishes solutions that can improve the current state of digital education. By incorporating new technologies as well as improving existing tools, it suggests great use of a hybrid teaching approach of physical and digital education.

Figure 1: Flowchart of Essay Structure
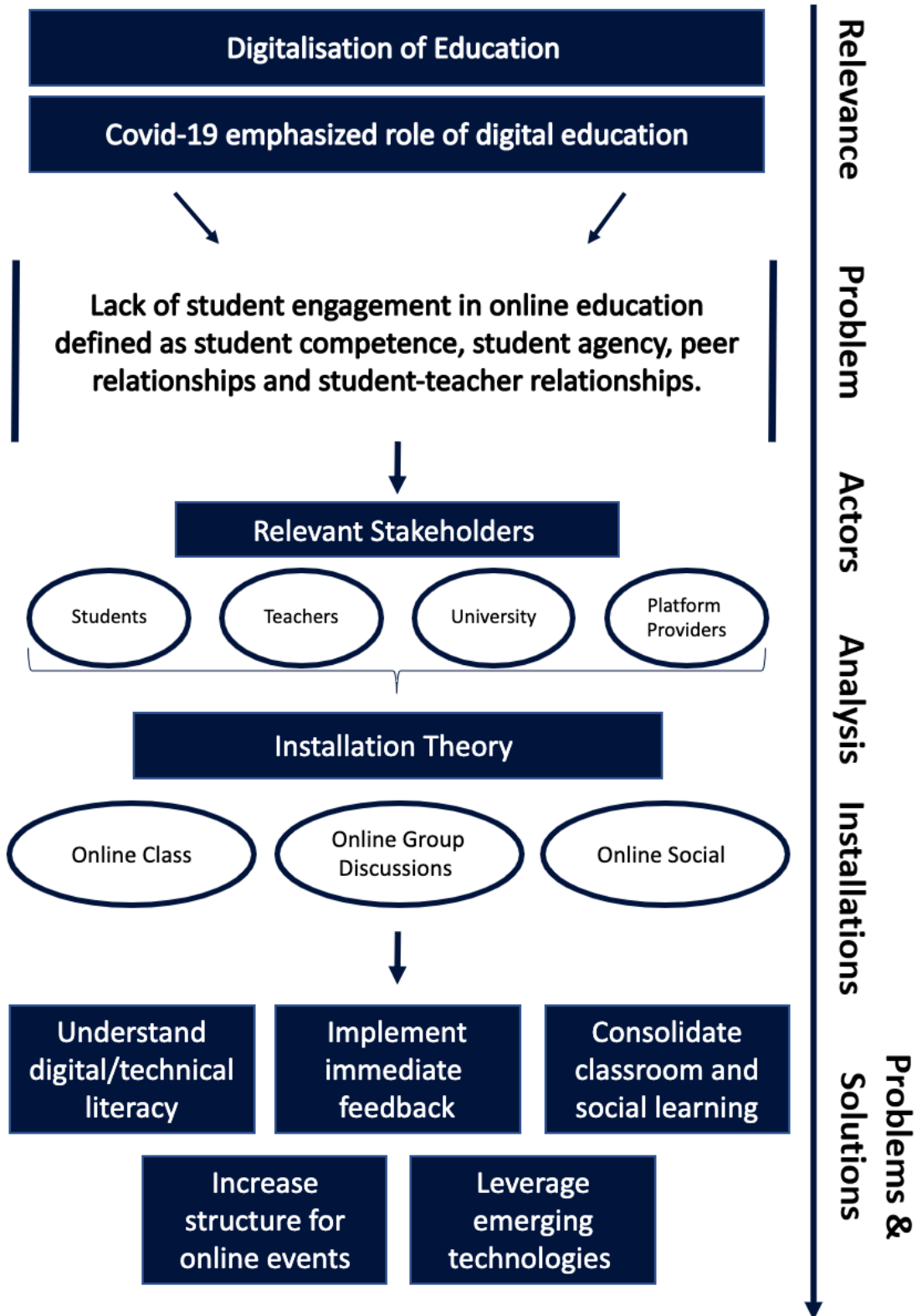
Literature Review

Digitalisation of Education

The digitalisation of education became a significant global trend in recent years (Machekhina, 2017). Smartphones and personal computers entered almost every household (Horst et al., 2021), as they have become a fixture of everyday life by facilitating an extensive array of activities to their users in multiple different contexts (Heitmayer & Lahlou, 2021). School systems, however, were often criticised as adapting too slow to technological change (Grosseck et al., 2020). This trend holds even in higher educational settings as many institutions are still not appropriately focussing on the topic. However, the potential is enormous as integrating technology into an educational context can reshape the educational environment to a student-centred dynamic (Nacu et al., 2018). Meanwhile, the increasing flexibility of conducting teaching materials and interactive assessment tools could help teachers and professors improve their teaching efficiency and students' learning outcome (Russell et al., 2006) while facilitating better access to education and contents (Dillahunt et al., 2014). It is crucial to recognise the potential online education has for students with a disability as it offers fewer physical barriers and logistical issues which were overlooked in the past (Dumford & Miller, 2018).

However, critics have been sceptical about the promising outcome that educational technology could bring (Mertala, 2020; Kopcha et al., 2016). Despite a significant increase in solutions, the prevalent claim that education is broken and can be fixed with technology must be critically examined, and actual student-centred designs must be adopted to improve outcomes (Schindler et al., 2017; Teräs & Kartoğlu, 2017).

Online Education Today

Currently Used Technologies

Covid-19 is an unprecedented crisis for modern education that forced universities to adopt new tools almost overnight to deliver learning material through new channels (Peimani & Kamalipour, 2021). Followingly, existing and well-known platforms such as Google Drive and Microsoft OneDrive were used (Bruns et al., 2021). Throughout the last years, an increasing number of software options entered the market, mainly as a facilitator for in-person education, like Moodle, personal SaaS or cloud spaces. For personal data management, security, cost and accessibility reasons, most institutions opt for open-source software (Xiao, 2020). As these platforms are used for transmission or storage of content, facilitation for online engagement is a secondary priority. However, as argued by Siemens (2005), it is important not to treat students as passive recipients but rather as active participants who create, develop and maintain connections to access and share necessary information.

Additional tools are needed to cater local needs and address engagement. Platforms such as Microsoft Teams or NextCloud already offer more advanced opportunities for students to collaborate. However, many students rely on other tools for digital interaction like Instagram, WhatsApp or Zoom, without a unified approach (see Appendix B).

Limitations of Currently Used Technology in Education

Gaining support, acquiring skills and navigating appropriate behaviour in a virtual learning environment are crucial preparations to adapt successfully to online education (Baran et al., 2013). Therefore, support from the material, psychological and social aspects should help navigate a safe and immersive learning environment for students (Lee & Hannafin, 2016). El-

Hmoudova (2014) suggested that new technologies and teaching styles can improve the quality of learning, and that it is necessary to provide explicit instructions and learning opportunities. However, research has also found that the current usage of technology in online education leads to a wide range of problems (Peimani & Kamalipour, 2021). For example, many people report psychological repercussions after extensive video calls, a phenomenon titled "Zoom fatigue" (Bailenson, 2021; Fosslien & West Duffy, 2020).

By being centred around the individual-oriented perspective in higher education, the digitalisation trends do not focus on the social aspects of learning, which is problematic, as learning is a social and interactive activity (Dawson, 2006). Socio-constructivist theory suggests that learning is strongly influenced by this socio-cultural context in which it takes place (Vygotsky, 1978). Recent pedagogical research emphasises the importance of discussions between students (George & Labas, 2008) and collaboration (Dawson, 2006), however, there is an absence of social interactions in virtual classrooms (Akbar, 2016).

Student Disengagement in Online Education

The integration of technology in university brings great potential in creating more engaging learning opportunities (Hofer et al., 2021). Increased engagement with the learning materials between students is especially promising as it is fostering beneficial student interaction. However, by adding an online learning environment, this engagement is challenged by limitations of currently used technologies in the educational sector (Ouzts, 2006). Even though online education is assumed to support learning flexibility and accessibility consequently creating a student-led learning environment (Kaplan & Haenlein, 2016), the current online education decreases personal interaction between students in a virtual environment and limits the

learning experience (Nair & Nair, 2021). This has brought a significant negative impact on student's engagement in online education. Both students and professional staff find it difficult to facilitate an energetic, collaborative, and interactive learning environment in an online classroom, as the inherent setting of the digital world has led to poor communication between participants (Moorhouse, 2020). Body language, natural eye contact, and other cues reflected by our physical presence effectively assist people in understanding others and the context in our daily lives, but are eliminated in the virtual classroom (Xing, 2011). This lack of student interconnection and the subsequent drop in student engagement is backed up by preliminary research conducted for this essay. In a survey (n=26), the majority of participants indicated that the student connection in online education could be better and that they are feeling disconnected towards their peers (see Appendix B).

Problem Definition

The outlined developments in university education led to the following problem delineation: Covid-19 accelerated the digitalisation of online education and exposed a lack of student engagement in online teaching, which is defined as student competence, student agency, peer relationships and student-teacher relationships. This essay explores the degree of student disengagement in digital education and proposes opportunities and solutions to foster student engagement.

III. Problem Analysis with Installation Theory

What is Installation Theory?

The essay uses an analytical framework of Installation Theory to review the current problems. Installation Theory utilises installations as functional units that assemble various components needed to perform an activity and defines them as "specific, local, societal settings, where humans are expected to behave predictably" (Lahlou, 2016, p.15). It breaks down an installation by analysing it in detail on its physical affordances (of the environment), embodied competencies (of the individual) and social regulations (of the society) (Lahlou, 2016). Physical affordances do not cause behaviour but constrain and control it. Embodied competencies are representations and skills needed to use or interpret an object or a situation. Lastly, social regulations are rules that are created and regulated by society leading to socially acceptable and desirable behaviour. Together these three layers scaffold, control and channel behaviour even in novice situations (Lahlou, 2016).

Why do we use Installation Theory?

Previous research has primarily focused on the technical design and function of the learning platform (Kerimbayev et al., 2020), the assessment of learning outcome (Wei et al., 2021), or the pedagogical design (Tualaulelei et al. 2021) of online learning. Although all of these are crucial issues in online education, they mainly emphasise on the used infrastructure in the online environment. However, online education is a pressing topic and needs to be analysed directly from the stakeholders' perspectives to gain a deeper analysis.

This essay applies Installation Theory to analyse the current situation in online learning for relevant installations and stakeholders to understand the root causes of student

disengagement. By introducing the three-layered analysis of Installation Theory, it is possible to define the physical resources that scaffold people's behaviour and more importantly include the other two essential dimensions, namely psychological and social perspectives. Consequently, Installation Theory unfolds processes involved in online education in detail by reviewing the existing online education at technological, social and psychological levels as well as considers the activities of multiple stakeholders involved within the installations.

Why the Three Installations?

While analysing student engagement, it is important to look at both the activities of the students and the setting in which these activities are performed (Webb et al., 2008). The impact of learning 'spaces' has become more prominent as there have been pedagogical shifts in higher education from the traditional, teacher-centred approach to a more flexible, student-centred approach (Oblinger, 2006). To gain multifaceted insights into the current shortcomings of online student engagement, a holistic view on the most critical digital student interactions has been established. Consequently, this essay focuses on understanding engagement in formal and informal learning environments at universities via the three installations of online class (classroom learning), online group discussion (peer to peer learning) and online social (social learning).

Physical Affordances

For all three installations, physical affordances need to be provided to and from the stakeholders to enable online education. The platform providers, developing the learning platforms, license their platform (e.g., Zoom) to the university, which further distribute it to

students and teachers (Liu et al., 2020). Moreover, both, teachers and students, need a device to access the platform (e.g., Laptop/ Computer) with an appropriate learning space for students and teaching space for teachers at home or on-campus. This space needs to be equipped with basics such as tables, chairs, and electricity and the option for silence work and talking. Internet access needs to be provided with sufficient bandwidth. Therefore, the university can play an active role in providing these affordances wherever possible. The platform needs to be updated regularly by the platform provider and needs to be usable from different operating systems. The platform's tools need to be provided, ranging from video calls to raising virtual hands, amongst other tools (see Appendix A for detailed analysis of the three installations).

Embodied Competences

Online Class

With the digitalisation of education, one of the preliminary aspects to consider is the differences in technical competencies of individuals. Students and teachers who are not well versed with technology find it difficult to set up and use the online learning platforms (Murray, 2014) and other online tools such as video conferencing platforms, collaborative work tools and online software. Digital incompetence is directly connected to students' academic competence by influencing the teaching and learning process and hindering collaboration. Online education also requires shifts in communication style and requires students, teachers, and universities to interact and communicate effectively in an online environment. Online education presents its challenges in reading behavioural and body language cues, structuring online classes, ability to show empathy and support well-being. Due to this lack of immediate, physical feedback in online teaching, teachers may lack the understanding to what extent their students can follow the class

content. Although there has been an increase in the number of students enrolled in online classes, the existing platforms find it challenging to maintain the levels of student engagement. Therefore, platform providers must understand how users interact with the various tools offered by the platform and increase the functionality of the platforms.

Online Group Discussion

In addition to the first installations' discussion of technical competencies and the ability to communicate effectively online, students need to be able to translate group work skills acquired in a physical environment onto an online environment and learn new ones. These skills include working on collaborative online software (e.g., Google docs, Zotero) facilitating discussions, scheduling the group's activities, and distributing work roles. When students can work on these group discussions without too much difficulty, it increases their autonomy, fosters positive peer to peer relationships and thereby their level of engagement. The universities need to support the students through any technical or ethical issues that may arise during online group discussions by acting like the problem management body. For the platform providers, the main challenge remains to provide tools that facilitate these group discussions and are user friendly.

Online Social

To organise and participate in online socials, students, teachers, and universities need to possess technical competencies in not only setting up and using videoconferencing platforms. Further usage of other immersive technologies like WBS "LearnSpace 3D" and Gather town, may be used for the social events. Additionally, for both the formal and informal socials, the students, teachers, and universities need to be familiar with organising online events and the

technical logistics behind these events, scheduling skills, and facilitating social interactions online. Both the universities and the platform providers must understand how students and teachers interact with the various tools and the platforms and incorporate this feedback into improving the platform.

Social Regulation

Online Class

Considering the sudden shift to a novel digital environment, building guidelines for online education is essential for related stakeholders. Although online education provides students with relatively higher flexibility in terms of work time and geographical location, students may lack the guidance to behave appropriately in an online classroom. For instance, self-muting and turning the camera will be socially desired since they improve discussions and engagement in the online course (Richardson et al., 2017). Without explicit structure such as outlines, rules and norms to guide these social practices, social presence could be challenging to build, decreasing the possibility of promoting the interaction and relationship between student and teacher (Kővári & Bak, 2021). It is also challenging for teachers to regulate and understand students' behaviours and foster their engagement. For instance, teachers may be reluctant to force passive students to join the discussion since it could cause a sense of intrusion and consequently may not be able to help students appropriately as they have no visual feedback. Therefore, the accumulation of this passive involvement in the online course, e.g., turned off cameras, will not only increase the barrier for facilitating the dynamic in the online classroom and forming the learning community but also dishearten the teachers (Leung et al., 2021). Even though the online learning platform provides policies in terms of protection for users, there is still a need for

proposing a structure that guides all activities in the online classroom and serves as a feedback loop for participants to communicate with others (Dumford & Miller, 2018).

Online Group Discussion

Virtual discussions led by students also need social regulations for maintaining discussions and ensuring all stakeholders follow a socially desirable path to demonstrate appropriate behaviour. Additionally, it needs active contribution from students to create a smooth and dynamic conversation in group discussion; for instance, actively showing face, participation in conversations and subtlety in avoiding an unpleasant situation like awkward silence. This would also help foster positive peer-to-peer relationships. However, Cassidy et al. (2021) suggest that students feel anxiety by keeping their camera on because they fear to present private space, constantly being conscious of the camera, and no feedback from the audience. Therefore, there is a need to create a structure and establish norms for students to follow, not only to reduce unwanted behaviour but also to encourage desired behaviour. Even in informal discussions, the rule of conduct is still essential for channelling users' behaviour, maintaining a safe space for participants and helping in building a community identity.

Online Social

Regulatory control is needed to guide all participants to perform socially desirable in the virtual environment. The creation of a safe social space for all stakeholders should be an essential issue in online education. For instance, lack of time scheduling and transparent rules of conduct for online socialising could hinder participants' motivation to join. These regulatory controls are established with support from platform providers and the universities. However, the

rules in an online social event stay unclear at the current stage as this may vary across cultures and disciplines. Furthermore, according to the survey done by Cassidy et al. (2021), constrained by the used technology (e.g., Zoom), a common feature of online discussion is that only one speaker speaks at any given point, which causes a sense of artificiality to participants, leading to an unpleasant experience for participants. Apart from the technical improvement through the above-mentioned immersive technologies, new structures should be designed to reduce the dichotomy between academic and social learning.

Identified Problems

Following the problem analysis, five significant problems currently limit student engagement at the level of university education that is of immediate concern are identified and considered for the scope of this essay. These include addressing: Different levels of technical and digital literacy; a lack of structure in online learning; lack of immediate and visual feedback; use of gamification and immersive technologies; and the dichotomy between education and social learning to reconstruct classroom experience and enhance student engagement.

IV. Solutions

Through analysis, it has been found that the current approaches in higher education lack explorations of new tools and clear directions of development. Universities should invest more into shaping the direction of their digitalisation, especially to connect this transition more to student engagement and the benefits of social software. The wide range of concurrent developed tools and approaches ought to be leveraged; websites like sourceforge.net/software/higher-education/ provide overviews of the wide range of applications that could potentially solve most

of the outlined problems. While exploring all available tools is outside the scope of this essay, a more unified solution must be adapted as the current online educational approach creates ambivalence for users relying on a range of tools. To facilitate this transition, the essay followingly proposes five concrete interventions.

1. **Digital/Technical Literacy**

A basic level of digital/technical literacy is a prerequisite for online education. Since students come from diverse backgrounds, it is crucial to address this to ensure equality of opportunities. With digital skills, students can learn to keep up with peers, participate, and adapt to established social expectations of online behaviour, including maintaining a professional demeanour, actively participating in discussions, and avoiding cyberbullying by creating a safe space (Maryville, n.d.).

Universities can create tutorial videos that explain the essential functions of the most used platforms for online learning. These tutorial videos could be circulated using the primary learning platform of the university (e.g., Moodle) and the tools used as default. This would not only help students familiarise themselves with the platforms, but they would also be able to increase their engagement through increased autonomy and competence. One such initiative is by Middlesex University, which established a "digital buddy scheme" whereby current students were trained on digital platforms by experts and then partnered with teaching staff. This helped establish a sense of confidence and belongingness amongst the staff and students (TimesHigherEducation, 2021).

2. Need for Increased Feedback

As the digital learning environment lacks verbal and non-verbal feedback while in a classroom or even social settings, "reading the room" (Korkmaz & Toraman, 2020) is normal human behaviour but is virtually almost impossible. Therefore, the essay emphasises the importance of feedback in this context. This means that within digital settings, hosts (educators or students) must collect feedback regularly. The proposed intervention encourages constant verbal feedback and regular written feedback; this should include written feedback after every session, evaluating overall aspects, and provide comments. Furthermore, the essay aims to propose developing a tool for existing solutions. This tool should enable constant digital feedback through a feedback bar within video calls, lectures and seminars to provide participants the opportunity for constant anonymised feedback. It is essential to phrase feedback positively and making it only visible for the host to avoid public judgement and social imitation effects. To establish this tool, universities can collaborate with specified providers (e.g., Zoom) or even open-Source software like NextCloud.

3. Two Digital Worlds: Classroom and Social Learning

While in in-person settings, formal and informal interactions are fluently integrated, with a social and educational exchange simultaneously happening. This interaction does not naturally happen in online environments resulting in a dichotomy between formal and informal interactions. As peer-to-peer learning and social activities appear to be essential for engagement and student performance (Nerantzi, 2020), this dichotomy needs to be mediated and foster more dynamic interactions in online teaching. First, the essay proposes to promote more breakout rooms to facilitate small-group interactive exchange as extensive exchange is difficult in bigger

settings through communication barriers and undefined social norms. Especially before and after classes, interaction should not be abruptly stopped. Gamified openings and closings offer, for example, a chance to foster further interaction and engagement. Moreover, the aim is to enable the exchange of the contents before and after the specific events. Here platforms like Microsoft Teams or Google Meets offer the opportunity to create forums or chats for each event. This provides access to contents used during calls or share documents in advance, which encourages a more relevant and dynamic interaction.

4. Structure

Compared to the traditional learning experience, in which participants can grab the cues from physical and visual connection with others and consequently gain understanding about the context (Davis et al., 2019), current online learning provides limited opportunity for participants to cultivate a guided learning experience. Therefore, clear structures and fundamental principles are needed to guide all participants to build fundamental induction to the novel learning space and create a safe and organised environment for academic and socialisation purposes (McKimm et al., 2020). Here, finalising the agenda for online class and discussion could assist students in being prepared for the class, avoid possible overloading and distractions in an online learning environment (Mulders et al., 2020) and improve the sense of safety for participants in a virtual environment.

Meanwhile, setting agenda before conducting the formal session would be helpful for instructors to organise their teaching content, create a smooth flow of learning experience, and improve instructor presence, by which teachers can effectively introduce and maintain the rules of the online class (Tartavulea et al., 2020). Besides, presenting a timetable at the initial stage of

informal events can help student understanding of the arrangement of sections and immerse themselves in virtual communication and socialisation. By doing so, the student-student and student-teacher interactions in online education could be strengthened, consequently improving the quality of online education (Huang & Luo, 2021).

5. Frontier Technologies in Online Education

As indicated in the Installation Theory analysis, the current behavioural and body cues in online education are constrained by the two-dimensional digital nature of the currently used video platform tools such as Zoom. This constraint can be overcome by leveraging the use of emerging technologies such as online virtual worlds. A tool such as LearnSpace 3D by WBS indicates how such a digital learning space can look (see Figure 2). Interaction with avatars in virtual worlds enhances interactivity between students by giving additional visual behavioural cues and lifting the constrain of only one person speaking at a time (Petrakou, 2010). It gives the students the chance to see each other's movements in the online space by, for instance, turning their avatar to the person whom they want to talk to. This addresses the constraint of body language cues in the currently used online education tools by adding a spatial dimension. Virtual online worlds can be complemented by utilising VR technology to further immerse the student in the online world.

Figure 2: Screenshot of "LearnSpace 3D" (WBS, 2021)
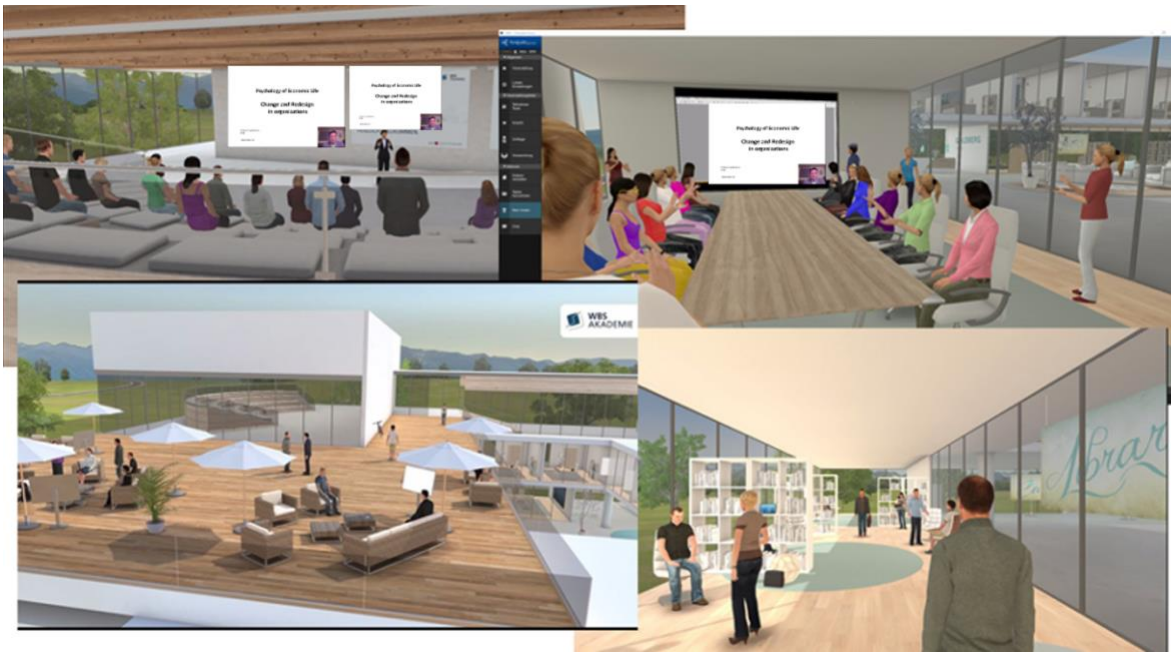
Note: LearnSpace 3D ® is an online virtual world for education

Gamification of online education

Another technological tool that can be leveraged is based upon the concept of gamification. Gamification utilises game-like features, such as virtual point systems (Hamari et al., 2014). Within the education context, gamification can foster theoretical understanding of concepts as they are perceived as enjoyable by students and therefore make appropriate use of the benefits of online education as compared to traditional physical education (Vlachopoulos & Makri, 2017). In online education, the use of badges or a point, as mentioned earlier, has been found to improve student attitude, engagement, and performance (Subhash & Cudney, 2018). Gamification may especially be helpful for online social interactions, as with, for instance, reality-based scenarios and action-oriented games. Here, students are encouraged by a playful design to give feedback to their peers and to interact, leading to enhanced collaboration.

Consequently, gamification can foster the social and personal aspect responsible for a successful student life that is limited in the current online educational context.

V. Conclusion

This essay explored the engagement of university students in online education. Pre-Covid-19, education was already facing difficulties adapting to digital developments. When the complete educational system moved online during Covid-19, the deficiency in resources for online learning was highlighted. Therefore, this essay established that there is potential for social psychology to help improve the online structure and foster better student engagement. Firstly, by reviewing the situation through the lens of Installation theory, the essay analysed the activities of each stakeholder involved in online education and looked at both, psychological and sociological, underpinnings for the lower levels of student engagement. Following this analysis, the proposed solutions include the creation of tutorial videos for online platform and tools; provision of immediate, visual feedback; breaking the dichotomy between social and classroom learning using collaborative online tools; structuring formal and informal learning and use of VR and other immersive technologies. Covid-19 has highlighted the potential of online education and initiated a global shift to develop new digital educational structures. All in all, this essay reviewed contemporary online education with the promise to bring the social side of learning to the digital world.

VI. Limitations

While the essay is in line with the recent trends and development in online education, some limitations have been identified. This essay is based on the perspectives of the researchers derived from their own student experiences at LSE and previous education settings. Though the researchers add multi-disciplinary and cross-cultural perspectives owing to their diverse backgrounds and of the surveys' participants, there may be further points of view that might be relevant. The findings and suggestions may not be equally suited due to pedagogical and cultural differences. Furthermore, as the suggestions involve stakeholders other than students, shortcomings may arise of applicability for teachers or institutions.

Since the pandemic is a recent occurrence and is ongoing at the time of this research, it is important to flag that future trends and discoveries can be expected. Due to the flexibility of remote learning in physical space, participants' socioeconomic and cultural background may influence their experience, level of agency and access to online education. While, using VR technology in education has its benefits, introducing and maintaining such a digitalised platform could bring additional cost to the universities. Additionally, research suggests that learning in a VR environment could lower the students' concentration, which may further impact students' learning outcome. Thus, the implementation of emerging technologies in higher education need to be further evaluated.

Although there is no doubt that the trend of digitalisation of education will continue post-Covid-19, it remains to be seen to what extent in-person education can be complemented and substituted by digital tools.

VII. Future relevance

There has been a shift towards decentralisation in education, which means there is less location dependency as everything can be transferred in an online environment. With online education, learning stopped from being centred around the university's location, leading to new learning associations.

With the usage of emerging digital technologies such as 3D virtual worlds, education breaks traditional thinking of education in rigid structures and environments. Especially, VR looks promising for specific areas of study: engineering, medical, and others. This shift towards digital technologies in education adds another part to the administrative work of universities. Software used cannot be seen as a once-off purchase but as a continuous development to stay in the loop of improvement and be up-to-date.

The proposed solutions will find application post-Covid-19 as well. Utilising the benefits of online education can improve in-person teaching by using concepts such as gamification to enhance cognition. This hybrid approach of digital as well as physical education has been understood by the EU as well. The EU established a Digital Education Action Plan ranging from 2021 till 2027 that focussed on the need for digitalisation in education further emphasising the relevance of this essay.

Covid-19 has amplified our realities of living in the Fourth Revolution and its growing application in higher education. It is time for universities to take up agency and develop tools to be the drivers for online education instead of being driven by it.

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VIII. Appendices

A. Installation Theory Tables

Online class (**Focus on student activity in class:** formal learning, organised by teachers) -->,
E.g. breakout rooms in class

Actor	Physical affordances	Embodied competences	Social regulation
Student	**License to access platform**: E.g. Zoom, Moodle **Device** for access: Laptop/ Computer - Learning **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking **Internet** access and sufficient bandwidth	- Technical competencies: Learning how to set up/ use online platform (Zoom) Problem: too technical --> stakeholders cant use platform --> Example: Moodle; => Solution: user-friendly platform - Adjustment to online teaching --> Different learning styles - Communication style to build relationships (online vs in person); ability to communicate online - Reading behavioural cues/body language tone	- Student behavioural cues while participating in the online discussions (E.g., mute yourself; camera on/off; using laptop instead of phone) - Relatively higher flexibility (scheduling/ boundaryless learning due to prerecorded lectures and internet) - Accountability: Student responsibility to not disrupt learning of others - Feedback loop to modify behaviour
Platform Provider	**Provide license** to use platform to university - Provide **platform** for different operation systems **Tools**: Range from Video call to raising hand (Others: send emoticon reactions;	- User friendly - Understand how user interacts with tool	- Terms and conditions for users - Data privacy policy - Support and guide users

	poll; breakout rooms; video filters; chat function; video call; recording; share screen; whiteboard; etc.) • **Updates**		
Teachers	• License to access **platform**: E.g. Zoom, Moodle • **Device** for access: Laptop/ Computer • Teaching **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking • **Internet** access and sufficient bandwidth	• Technical competencies: Learning how to set up/ use online platform (Zoom) • Adjustment to online teaching --> Different learning styles • Communication style to build relationships (online vs in person) (Fred --> Frequency); ability to communicate online • Reading behavioural clues/body language tone • Empabehaviourallc lues/body	• Difficult to facilitate the dynamic of discussion in class (e.g., Ask student to turn on camera) • Online education tradeoff: Time constraints – Location flexibility; Lower time flexibility (scheduling/locations) --> Time constraints: students with different time zones • More location flexibility • Regulatory control over students (discipline) • Gatekeeping/ Front line problem management (ethics) • Join the feedback loop: promote/ modify behaviour
University	• **Provide license** to use **platform** to staff and students: (E.g. Zoom, Moodle) • **Provide devices** for access: Laptop/ Computer • **Provide** learning/ teaching **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking	• Shift from on-campus to online teaching mode • Understand how teacher and students perceive teaching (Feedback) • Allowing students to scheduling • Problem management (technical + ethics)	• Regulatory framework for teachers and students on how to use platform • Code of conduct within uni (racist attitudes, sexual misconduct, etc.) • Problem management (ethics) • Join the feedback loop: promote/ modify behaviour

	• **Provide Internet** access and sufficient bandwidth at university buildings		

Group discussion (**Focus on student-led group projects**: informal learning, group projects and other collaboration opportunities) --,>, E.g. group project meet-ups organised by group (peer learning)

Actor	Physical affordances	Embodied competences	Social regulation
Student	• License to access **platform**: E.g. Zoom, Moodle • **Device** for access: Laptop/ Computer • Learning **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking • **Internet** access and sufficient bandwidth	• Group work skills • Online social communication skills • Appropriate use of online collaboration tools (like online Microsoft word, Zotero) • Technical competencies: Learning how to set up/ use online meeting platform (Zoom)) • Reading behavioural cues/body language tone	• Students behave appropriately while participating in the online discussions (e.g., mute yourself; the camera on/off; using a laptop instead of phone) • Timely contributions of good quality (accountability) • Punctuality • Staying on topic without long breaks (Julian) • Contributions / showing face /Avoiding unpleasant situation (e.g., awkward silence)
Platform Provider	• **Provide license** to use platform to university • Provide **platform** for different operation systems • **Tools**: Range from Video call to raising hand (Others: send emoticon reactions; poll; breakout rooms; video filters; chat function; video call; recording; share screen; whiteboard; etc.)	• User friendly • Understand how user interacts with tool	• Terms and conditions for users • Data privacy policy • Support and guide users

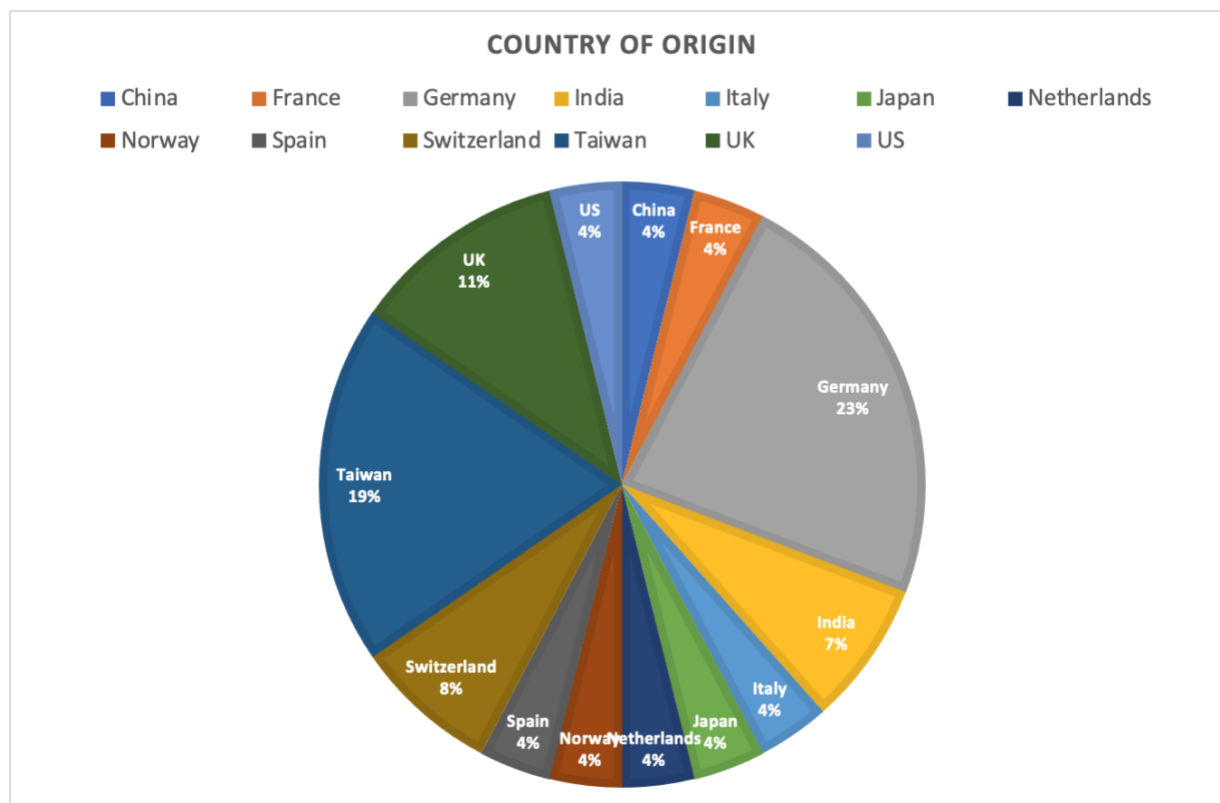|			
	• **Updates**		
Teachers	• N/A	• N/A	• N/A
University	• **Provide license** to use **platform** to staff and students: (E.g. Zoom, Moodle) • **Provide devices** for access: Laptop/ Computer • **Provide** learning/ teaching **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking • **Provide Internet** access and sufficient bandwidth at university buildings	• Problem management (technical + ethics) • Technical competencies: Learning how to set up/ use an online platform (Zoom) • Resource pooling – grouping competencies/iden tity • Will	• Code of conduct within uni (racist attitudes, sexual misconduct, etc.) • --> If you misbehave, you can report to uni.

Online social (**Focus on student life**: WBS, Gather town, Zoom, distinguish between planned (university) vs unplanned socials (students)) -->, E.g. social networking (alumni meeting)
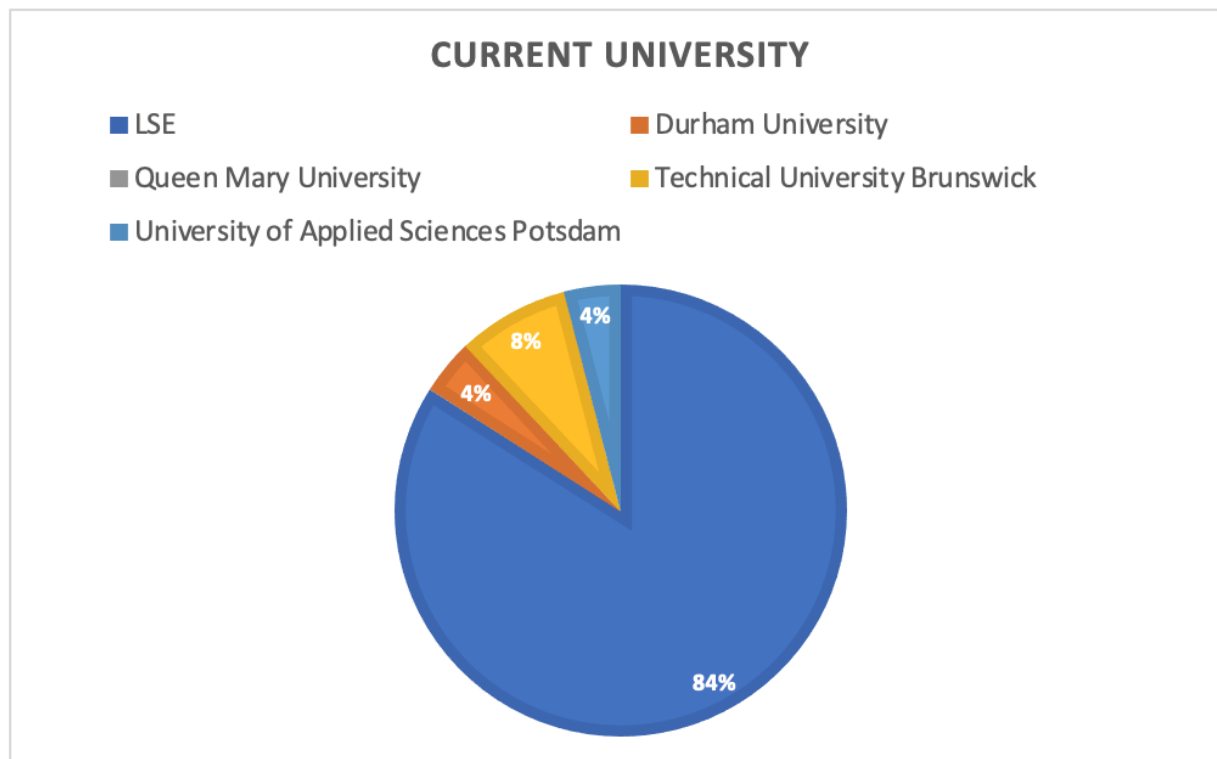
Actor	Physical affordances	Embodied competences	Social regulation
Student	• License to access **platform**: E.g. Zoom, Moodle • **Device** for access: Laptop/ Computer • Learning **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking • **Internet** access and sufficient bandwidth	• Online social communication skills • Facilitating social interaction • Technical competencies: Learning how to set up/ use online meeting platform (Zoom) • Scheduling and organisational skills in an online environment	• Students behave appropriately while participating in the online social • Punctuality • Contributions / showing face /Avoiding unpleasant situation (e.g., awkward silence)

		• Read behavioural oral clues/body language tone • Empathy and well-being skills	
Platform Provider	• **Provide license** to use platform to university • Provide **platform** for different operation systems • **Tools**: Range from Video call to raising hand (Others: send emoticon reactions; poll; breakout rooms; video filters; chat function; video call; recording; share screen; whiteboard; etc.) • **Updates**	• User friendly • Understand how user interacts with tool	• Terms and conditions for users • Data privacy policy • Support and guide users
Teachers	• License to access **platform**: E.g. Zoom, Moodle • **Device** for access: Laptop/ Computer • Teaching **space** (Home or on-campus) • **Internet** access and sufficient bandwidth	• Online social communication skills • Facilitating social interaction • Technical competencies: Learning how to set up/ use an online meeting platform (Zoom) • Scheduling and organisational skills in an online environment • Spectator role: Reduced authority to increase student autonomy (unplanned) • Gatekeeping skills (act as middlemen between student and uni) • Empathy and well-being skills	• Lack of guidance to behave appropriately in an online class • Gatekeeping/ Front line problem management (ethics)

University	• **Provide license** to use the **platform** to staff and students: (E.g. Zoom, Moodle) • **Provide devices** for access: Laptop/ Computer • **Provide** learning/ teaching **space** (Home or on-campus) with basics: Table, chair, electricity, etc. + the option for silence and talking • **Provide Internet** access and sufficient bandwidth at university buildings	• Facilitating social interaction (if planned by uni) • Understand how teacher and students perceive interaction (Feedback) • Problem management (technical + ethics) • Scheduling and organisational skills in an online environment • Maxi	• Regulatory framework for teachers and students on how to use platform • Code of conduct within uni (racist attitudes, sexual misconduct, etc.) • Problem management (ethics)

B. Survey Results

CURRENT UNIVERSITY

■ LSE   ■ Durham University
■ Queen Mary University   ■ Technical University Brunswick
■ University of Applied Sciences Potsdam

What were your expectations towards studying online?
Not that different as UK university has reputation for paying £9000 per year undergrad for PowerPoint slides being read out
I don't like it but it saves a lot of time
Less interactive and less engaging
Convenient but boring
Actually I was a bit scared of online uni and not really excited about it because I knew that it would be much harder to engage and motivate oneself to study alone in a room without any face to face contact. What I also expected was to work even longer and more intense due to the missing breaks you would have when studying would be online, e.g going to a café between two courses or just have a chat with your student friends.
Same results as in person teaching
Not the best
I expected discussions and team work to be less efficient as it is harder to communicate.
Low expectations
that it would be okay
Same as expected, didn't feel very connected or engaged, less effort than normal
No expectation
Having more chances to repeat the video
Very lonely, less engaging discussions and harder to keep focus
it will get hard and boring
More deeper communications and discussions with prof. And interactive lectures
interactive online activities and lectures
that it wasn't gonna be engaging
Flexibility in time table
I thought it will be challenging and boring
More personalised access, my time / when I want, more productive interaction
To still get the most of the learning experience. To have to the extent possible a classroom learning experience in terms of intellectual discussions, building networks with peers and professors, to enjoy whatever i was learning.
flexible teaching module

How do you think you can feel more connected to students outside the classroom?
If we all go to the library or to campus together
More LSE facilitated social events
It was difficult to make friends
By socializing and know as many people as I can.
I think we need to emulate the classroom as much as possible: Online worlds may increase connection between students
Organised social events?
By having more opportunities to work together on coursework. In addition also have informal meet-ups online in order to discuss our likes and things we found interesting. By building a community online.
organize study groups, drinks, game nights
Social event arrangement- online/offline
Organize group on WhatsApp and chat with them
Going out with them more often during weekends
There could be more interactive discussions about academic/informal topics online and in person.
I think it's quite hard to feel connected if you aren't in a face to face environment… of course you could try to start small talk before the actual project begins, but it's still not the same. What I would recommend is to ask directly the students about their feelings, how they deal with all this uni online stuff and also to sensitive others that it's okay to feel a bit overwhelmed with everything and that it's just harder online. I think having talks like that makes you feel of being part of the same ingroup and it helps you get connected to your peers even though it's a pandemic.
Breakout rooms at the beginning, chat before class is missing, too confined to the actual content,
There should be more virtual places and events to meet other students and faculty members.
In person activities
Organized activities in person, not online.
Do stuff in person
by meeting them more frequently on zoom
Encourage students to join online activities
Interactive seminars, interesting social events
attendance allowed in courses

How connected do you feel to other students in the online teaching environment?
26 Antworten
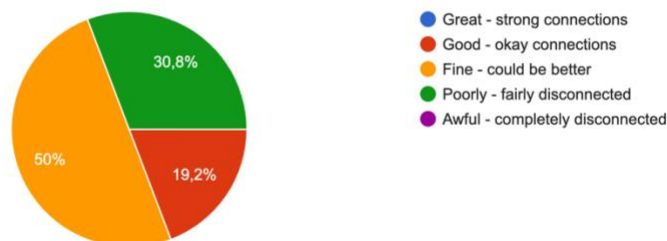
What medium do you use most to communicate with other students about university?
Big Blue Button
Face to face
WhatsApp
Zoom
Other interal networks
Zoom
Calling
WeChat
Student Forum

Do you think your university could improve its online teaching? If so, how?
Think it's done well considering context
I don't know honestly, I like how LSE is dealing with it
It's as good as it can be in my opinion just not quite the same as in-person
Could make more effort on getting more interaction within small groups
Online teaching will never substitute in person teaching. Go back to in person asap!
I think my university is doing quite fine
Digital services offer many opportunities that can enhance teaching and communication. Some professorts and tutors lack the needed skills and experience to include these tools in their classes and would benefit from courses in online/digital education. The university currently tries to improve its online offerings, but could think way past the ongoing pandemic.
Live lectures (not only pre-recorded), interactive digital environments
through having smaller class sizes than normal to encourage speaking up when teaching is done online
Use more engaging features, e.g. quizes (on kahoot maybe), hold live lectures, have more organized seminars, more group work
Yes. But no clue
Yes, they can tell the prof. to try the system before the class, so it can safe a lot of time.
classes
Yes
Yes. By holding more live sessions instead of recording lectures
Hybrid + online socials
By engaging in discussions during classes
LSE should use more gamification aspects like an online campus
yes, informal is so important and we just realise that
By not making it feel like my education experience is just me and my laptop (more social connection), by providing opportunities to collaborate not just with my cohort but also students within the department and across the school, by having more mandatory events (reducing the current flexibility to some extent)
Improving the functions of Moodle and encouraging teachers/students to use them; Help the teachers to be prepared for online teaching; encouraging interaction between teachers/students

C. Screenshots