COVID-19 and Online Learning Blues: Are Multiple Intelligences out the Window for Second Year Ecotourism Students?

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ABSTRACT

Universities have had to crash-land into new ways of teaching, learning and assessment amid COVID-19 associated lockdown. The lockdown forced universities to fast track tele-education, which suddenly invaded spaces where traditional forms of education had been the order of the day. While both staff and students were overwhelmed by the facilitated plunge, the shock was particularly destabilising for students from rural areas and impoverished neighbourhoods. The paper investigated COVID-19 lockdown-associated blues for second year ecotourism students at the Durban University of Technology. Questionnaires were distributed and returned using WhatsApp, email and MS Teams to all 174 students registered for Ecotourism Management 2 in 2020. As many as 42 fully completed questionnaires were returned on the same day which, was interpreted by the researcher as an outlet for bottled-in emotions. The study found that students were not ready for online learning due to a number of constraints ranging from lack of laptops, network challenges especially in rural areas, data shortages, household chores that took priority, space constraints, noise and lack of support at home in some cases. Consequently, they saw online learning as an interim solution than a lasting option for their education.

Introduction

University campuses are places where communities of students and staff live, study and work in close proximity to each other to provide unique opportunities for enculturation into the field, facilities for individual and shared cognitive and non-cognitive development through participation in curricular and extra-curricular activities (Wai, 2019). The World Bank (2020) points out that failure to sustain tertiary education systems would lead to devastating socio-economic consequences emanating from youth disengagement and deprivation. The World Bank (2020, p.1) further identifies an estimated 222 605 496 (99%) of enrolled tertiary students worldwide that were disrupted by lockdowns, (United Nations, 2020) particularly so in low and lower-middle income countries. Marinoni & de Wit (2020) observe that African regions closed their campuses as a preventive measure, much earlier than higher education institutions in other regions, leaving them stranded while developing academic continuity measures.

According to the SDG-Education 2030 Steering Committee (2020) learning is a human right which should not stop even in pandemic crisis times, meaning that new ways of teaching, learning, assessment, conducting research and engaging with local communities had to be found (Marinoni & de Wit, 2020). While convenient for some, for others anywhere virtual learning is viewed as exacerbating the divide between affluent and marginalised students as the playfield in not level (Marinoni & de Wit, 2020; UN, 2020; SDG-Education 2030 Steering Committee, 2020), due to the quality of content delivered, technological limitations, and inadequately prepared providers and students (Krishnan, Ching, Ramalingam, Maruthai, Kandasamy, De Mello, Munian & Ling, 2020) which all lead to frustration and demotivation.

While the UN (2020) takes the pandemic as an opportunity to reimagine education and fast track the transformation of teaching, learning and assessment, some students take anywhere virtual lectures as temporary disruptions to their normal brick and mortar learning landscape and hope that the normal will soon be restored.

Literature Review

Shenoy, Mahendra & Vijay (2020) point out that at the University of Pune, India, just like other parts of the world, many faculties had resisted the uptake of virtual classes for students until they were forced by the Covid-19 pandemic and associated lockdowns. Consequently the massification of online learning was untested and

challenging for both faculties and students. The United Nations Educational, Scientific and Cultural Organization (2020) points out that the rush to implement online learning to save 2020 academic year in response to Covid-19 closure of universities (Jansen, 2020; UN, 2020) exacerbated pre-existing disparities between advantaged and marginalised, urban and remote rural, technologically-ready and underprepared as well as those with special needs and fully-able student groups. While the mandate from ministries of higher education was continuity to provide accessible and uniform-quality education leaving no student behind, outcries were heard about solutions that could visit injustices on some students (Mathiba, 2020; Mnguni, 2020) due to non-even technological playfields. Student interests must be at the heart of every conversations ensuring inclusivity and equity for all (Parkin & Brown, 2020; SDG-Education 2030 Steering Committee (2020) and if one student is left behind by the online regime, it would make it unjust and unfit for purpose (Mnguni, 2020).

Due to lockdown and ongoing calls for social distancing, students found themselves unable to interact with others as interpersonal beings, they were unable to share knowledge, skills and resources (Elmer, Mepham & Stadtfeld, 2020; Segalo, Molebatsi & Vokwana, 2020), meaning that isolation was not only physical, but emotional, psychological as well as educational. Elmer et al. (2020) posit that reduced social interaction, lack of support and pressure to perform academically under lockdown conditions could have negative effects on the mental health of students. In support Kaparounaki, Patsali, Mousa, Papadopoulou, Papadopoulou & Fountoulakis (2020) in a study conducted in Greece found that there was increased depression leading to suicidal intentions, loss of value of life, anxiety and high quantity but poor quality sleep. In a study on the psychological impact of Covid-19 on Pakistani University students, Salman, Asif, Mustafad, Khan, Shehzadi, Hussain, Tahir, Raza & Khan (2020) found that sensational media reporting, many conspiracy theories and physical separation negatively impacted the mental health of students leading to frustration, boredom and blues amid loss of financial security in some cases, lack of personal space, inability to be a normal students and interact with lecturers and friends. In their study conducted in Switzerland on students' social networks and mental health before and during the Covid-19, Elmer et al. (2020) revealed that the students were more depressed, more anxious, more stressed and lonelier than they had been prior to the lockdown.

While online learning may offer unprecedented accessibility to quality education through massification, there are a number of associated challenges such as students having to juggle study and family life (Kemp & Grieve, 2014; Meyer, 2020), equity, cognitive adaptation, availability of support, accessibility to technology, technology intelligence and sufficient (Jansen, 2020) bandwidth especially for deep rural and lower socio-economic neighbourhoods and the level of computer literacy for both the students and lecturers, that have to be taken into account. Darling-Hammond, Edgerton, Truong & Cookson (2020) argue that there should be seamless connection between in-school and out-of-school connectivity to cater for different settings in which learning is expected to take place. Online learning helped to offer a temporary solution to the problem faced by higher education due to the pandemic, but it 'cannot satisfy all educational needs and goals' and therefore may not be the best way to teach and learn for those who initially wanted to be resident contact students (University of Illinois Springfield, 2020, p.1). In support, Wai (2019) points out that universities have to conduct research, reach out to industry partners and help solve community problems through improvement of cognitive and non-cognitive skills, which all cannot be reduced to online virtual which Wai 2019) sees as a threat to education. In a study conducted in Florida, Loeb (2020) discovered that students that struggle in contact sessions were more likely to perform even worst online because Loeb further argues in contact is more effective than online learning, especially for students from weaker academic backgrounds.

In an article on students' learning characteristics, Karagiannopoulou & Entwistle (2019, p.1) highlight the significance of 'meeting of minds', teacher-learner relationship, directing, supporting, creating learning ethos, conveying feelings, arousing interest, authenticity, emotional proximity, discipline values and others, which are all lacking in online learning. Certain students expressed perceptions of being largely neglected (Holley & Oliver, 2010; Ituma, 2011) as the initial experience of online learning failed to live up to their expectations partly because of technological constraints and inexperience for both staff and students (Kemp and Grieve, 2014). In a study conducted at the University of Tasmania, Kemp and Grieve found that students preferred studying topics face-to-face rather than online, and would rather write and do written submissions online. They further assert that the benefits of online learning cannot replace the benefits of traditional face-to-face learning, an argument supported by López-Pérez,

Pérez-López & Rodríguez-Ariza (2010); Mitchell & Forer (2010) when arguing that ICT was developed to complement traditional forms of learning in a blended manner. Kapasia, Paul, Roy, Saha, Zaveri, Mallick, Barman, Das & Chouhan (2020) found that in West Bengal, India only 14.1% attended online classes daily, 54% about three times a week blaming it on poor connectivity, which was contrary to the 100% virtual attendance reported by Shenoy et al. (2020) at the University of Pune, India. Consequently students tended to rely more on sharing and downloading materials via familiar platforms such as WhatsApp (39.2%), Google and YouTube than attend online lectures. Rapanta, Botturi, Goodyear, Guàrdia & Koole (2020) highlight the importance of inclusion of pedagogical foundations and knowledge of principles to facilitate meaningful learning experiences.

Multiple intelligences

Ngqakamba (2020) cites the incoming Vice Chancellor of the University of Witwatersrand (WITS) (Professor Zeblon Vilakazi) pointing out that education is more than just receiving content, 'it is about interaction' and (Mtose, 2020) quality learning experience which necessitates reinventing higher education, rather than just providing gadgets, (Parkin & Brown, 2020) it is about human relationships and people first before technology. Gardner (1983); Marenus (2020) argue that all people have different kinds of intelligences and that learning should embrace and enhance their dominant intelligences and help develop weaker ones (Hlengwa & Zaca, 2018) as all intelligences are needed to live a fully-balanced life (Herndon, 2018). Intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural settings (Gardner, 1983), ability to encode, evaluate and utilise large amount of novel information quickly and seeing one thing in terms of another, seeing connections among seemingly disparate pieces of information as a means of understanding the bigger picture (Fleetham, 2006) and capacity to learn, understand, handle complexity and solve problems in useful contexts (Mankad, 2015). Students' dominant intelligences influence (Amir, Jelas & Rahman, 2011) their approaches to learning as well as the courses they choose to study and (Lopez & Patron, 2012) should therefore be at the core of designing a course, whether for face-to-face or online learning.

Altan (2020); Gardner (1983) posit that in practice every student in every classroom brings a collection of multiple intelligences, each to varying degrees of strength, implying that they all are capable of language,

mathematical, musical, visual, kinaesthetic, intrapersonal, interpersonal, naturalistic and existential learning and understanding to varying degrees. Clearly this would apply to the use of technology as well. If technology is used as the sole medium of teaching, learning and assessment, certain intelligences are discouraged and even eliminated. It doesn't seem that we can prepare graduates for 'real-world intelligence' through online learning (Altan, 2020, p.24). Known and documented intelligences are Verbal-Linguistic Intelligence (understanding of sounds and words), Mathematical-Logical Intelligence (ability to interpret numerical symbols), Musical Intelligence (development and appropriate response to rhythm, tone and pitch), Visual-Spatial Intelligence making sense of images and spatial reality), Bodily-Kinesthetic Intelligence (the joy of skilful and appropriate movement), Intrapersonal Intelligence (self-awareness and emotional intelligence), Interpersonal Intelligence (ability to function in contexts), Naturalist Intelligence (recognize different environmental and physical features and objects and their value), Existential Intelligence (ability to grasp deep existential questions) (Herndon, 2018; Hlengwa & Zaca, 2018; Mankad, 2015; Marenus, 2020) & Martin (2001) Philosophical Ethical Intelligence (adherence to ethical and legal guidelines for positive public image). Mankad (2015) goes further to link multiple intelligences to different careers while Martins (2001) views them as interdependent, supportive and enriching to each other. The intrapersonal and philosophical ethical intelligences tend to be non-career specific, while the naturalistic intelligence leads to careers such as farming, landscaping, botany, biology, weather and climate, geology, animal husbandry (Martin, 2001), and I might add nature conservation and ecotourism.

In a study on educational implications of the theory of multiple intelligences conducted in Pittsburgh, Gardner & Hatch (1989) found that human learning occurs in modular fashion, where separate psychological functions are at play when students listen to music, dance, do calculations, interpret images, go for site visits, watch videos, etc. They then concluded that students may be precocious with one form of symbol use, without any necessary carryover to other forms. Similarly in their study conducted at the University of Granada, López-Pérez et al. (2010) found students felt that they learnt more and understood subject content better in FTF learning than e-learning also stating that FTF contributed more to their motivation. They therefore concluded that e-learning can complement, but cannot replace FTF learning. Kallenbach & Viens (2001) reported from their

study on adult multiple intelligences conduced in collaboration with Harvard Project Zero and the New England Literacy Resource Centre that looking at daunting academic tasks through the lens of different intelligences by finding multiple entry points into the material, helps maintain the dignity and security of all the students. According to Pearce (2016); Wornyo, Klu & Motlhaka (2018) learning has to be natural and authentic to equip students as future leaders with knowledge and skills to handle real-life issues through exposure to and participation in real-world experiences to connect theory and practice allowing students to strengthen their dominant intelligences and also develop weaker ones. Garrison (2012) concurs when stating that inquiry based on online learning does not lend itself to collaborative and constructivist approaches that foster deep learning. Arias, Swinton and Anders (2018) are of the view that online learning should be used to augment lectures with readily available videos, streams and notes and they refer to Brown's & Liedholm's (2002) where FTF students performed significantly better than online students.

In a study conducted by Hanover Research with 172 university presidents and chancellors in March 2020, 100% stated that they were going to move majority of FTF classes online in the future, however noting such concerns as maintaining student engagement (81%), ensuring student access (69%), ensuring high academic standards (59%), technology readiness (52%) and others. While there is a lot of support for blended learning (FTF and online), Roskvist, Eggleton and Goodyear-Smith (2020) expressed doubt if purely online learning could wholly replace exposure to practical learning and (Arias et al., 2018) if the two approaches are interchangeable. Altan (2020); Gardner (1999) argue that intelligences work in combination, not isolation in contexts of various disciplines where graduates participate fully to contribute to the development of their fields. Roddy, Amiet, Chung, Holt, Shaw, McKenzie, Garivaldis, Lodge & Mundy (2017) seem to think that online flexible learning is more suited for students who seek up-skilling, retraining and further studies and are willing to (Kemp & Grieve, 2014) juggle study, work and family life, not so much the case with younger resident students.

Nature of ecotourism learning

The World Economic Forum (2015) points out that the 21st century requires knowledge and extensive set of skills such as problem-solving, collaboration, ability to think out of the box and on their feet and (Calderon & Sidhu, 2014) a university degree is as important as it is able to provide and enhance these skills (Amir et al.,

2011) in social contexts. The big question is whether online learning can provide such skills and enable graduates to function in diverse and dynamic societies and organisations. This brings us back to Gardner's multiple intelligences of being able to understand sounds and words and react appropriately; interpret numerical symbols to inform decisions; respond appropriately to rhythm, tone and pitch, make sense of images and spatial reality; move skilfully and appropriately in response to stimuli; being self-aware and emotionally intelligent to be able to function optimally in contexts; recognize different environmental features and objects and their value to life and grasp, interpret and use deep existential questions. In their definition of ecotourism, Chai-Arayalert (2020); de Crom & de Jager (2013) put emphasis on the natural environment, conservation, ecology, culture, environmental education and interpretation, I might add communion with nature, which can be explained, but not experienced virtually.

As Mankad (2015) pointed out, people who choose such careers as farming, landscaping, nature conservation, botany, ecotourism, biology, etc., which make them work in natural environments tend to use their naturalistic intelligence more than other intelligences. Chai-Arayalert (2020) argues that the aims of ecotourism can be achieved through appropriate activities that enhance ecotourism experience, (Hayes, 2009) foster naturalistic content knowledge and process skills, which can only be achieved in the field. de Crom & de Jager (2013) advocate for the use of technology during and after fieldwork in the teaching of ecotourism, to (Hayes, 2009) develop dynamic practitioners with 'fluid ability' to solve real-world problems in contexts where they exist. Urias & Russo (2009) promote cooperative, experiential, and engaged process ecotourism learning that take students out of their comfort zones into contexts that will make them think critically about and solve real-world community issues linked to their learning outcomes. In agreement Hlengwa & Zaca (2018) argue that field visits and fieldwork as some of the methods of teaching eco/tourism engage a full range of intelligences and provide insight into classroom learning through providing opportunity for authentic learning at least some of the time. Mchunu & Hlengwa (2018) regard field learning approach to ecotourism as constructivist (Lave & Wenger, 1991), providing opportunity for students to develop their own understanding through (Hayes, 2009) problem and enquiry-based interaction with real-life items and discussions, which enhances cognitive and affective development (deWitt & Storksdieck, 2008). Technology is used to complement

existing and emerging pedagogical approaches (WEF, 2015) such as experiential, project and inquiry-based learning methods.

Applying the principles and practices commonly associated with authentic and experiential learning enables students to gain lasting benefits through their active participation in real-life project during field visits and even on campus activities (Coles, Poland & Clifton, 2014). de Crom & de Jager (2013) view ecotourism as learning that incorporates the educational and spiritual dimensions, which cannot be tapped into virtually if practitioners are to be well-prepared to deliver expected level of service. In support, James & Pollard (2006) posit that out of school learning is as significant as formal learning as it (Coles et al., 2014) aligns educational goals with standards, norms and values of local communities and industry.

Methods

There were 174 students registered for the subject Ecotourism Management 2 in 2020. These students were exposed to FTF learning for about 8 weeks prior to the lockdown that was announced by the President Cyril Ramaphosa on 15th March to take effect on 26th March 2020 (Hlengwa, 2020; Nortier, 2020). The subject is composed of two modules (Entrepreneurship and Financial Management) taught concurrently. In the previous years this level got exposed to a three-day long national tour to various ecotourism destinations and businesses and got opportunities to experience the operations of the industry they would be joining upon graduation. Unfortunately for this cohort, the opportunity was missed to lockdown. The study was cross-sectional case by design, collecting data of experiences and feelings at that particular period. Under lockdown conditions, questionnaire was distributed via MS Teams and group WhatsApp on the 16th August and returned on the 21st August to allow those with network connectivity challenges to access and send back. The participants were allowed to return them using the same platforms and email. A total of 105 (60.3%) questionnaires were returned on time (about 98% via email and 2% via MS Teams) and used for this paper. Others were returned later after data had been analysed and were excluded in this study. The questionnaire was composed of mainly quantitative items and some qualitative items because it was important to establish the feelings of the students regarding the methods used to present the course under lockdown conditions.

Results

Almost all the participants (99.0%) were at home during the lockdown and 78.1% resided in rural areas quite significant at $p < 0.001$, 19.0% in the townships and only 2.9% were city dwellers. Consequently almost all of the 105 participants (95.2%) had challenges trying to attend online lectures. Of all their challenges household chore (97.1%) ranked highest as a problem competing with online lecture attendance and assigned tasks, network connectivity followed at 91.4%, which was followed by shortage of space and lack of privacy to work at 75.2%. Other challenges included noise either at home or neighbourhood because most if not all the people were at home (63.8%), shortage of data 55.2%, lack of or low quality gadgets (44.8%), poor communication from the university and department (30.5%) and surprisingly isolation ranked very low at 16.2%. As Letseka, Letseka & Pitsoe (2018) pointed out, even after two-and-half decades of democratic elections, vast inequalities across residential socio-economic status still persist in South Africa, making the technological playfields uneven (Mathiba, 2020) and home-based online learning unjust and unfit for purpose (Mnguni, 2020) as provision may be inequitable and exclusive (SDG-Education 2030 Steering Committee, 2020). This paper was also aimed at determining the perceived importance of catering for multiple intelligences in higher education as postulated by Garner (1983) and supported by many such as Altan (2020); Herndon (2018); Hlengwa & Zaca (2018); Marenus (2020); Parkin & Brown, 2020; Vilakazi (2020). Figure 1 illustrates a number of opportunities that the participants felt they had missed.
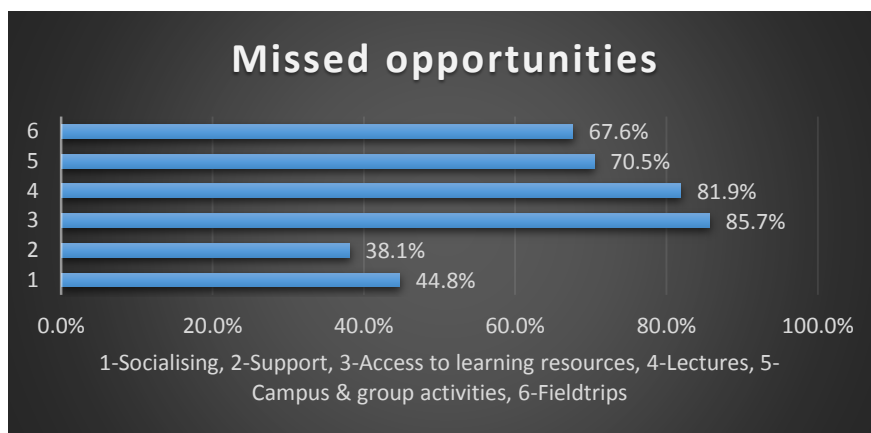
Figure 1. Missed opportunities

University education is meant to develop and enhance knowledge and skills to answer modern day industry-specific questions and produce knowledge to solve current and emerging real life problems (Mankad, 2015; WEF, 2015) and as presented in this paper, students tend to choose careers related to their dominant intelligences (Amir et al., 2011; Lopez & Patron, 2012). It was clear that under the circumstances, participants put more significance on lack of access to learning materials (85.7%), lectures (81.9%) which they had missed especially due to poor network connectivity, shortage of data and competing agendas at home. They were also concerned about missing out on campus and group activities (70.5%), the signature second year interprovincial fieldtrip which offers opportunities for authentic outdoor ecotourism learning (67.6%), socialising (44.8%) and support from lecturers, tutors and other students. Missing such opportunities made them stressed (83.5%), depressed (71.8%), worried

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(68.0%), concerned about their education (66.0%), fearful (65.5%), unsettled (48.5%), anxious (45.6%), angry (38.8%), and others. They pointed out that they would have gained a lot of knowledge and experience from campus activities and the fieldtrip, but online learning did not give them any experience. Ecotourism knowledge and skills are best acquired in the field as that allows for out of the box real world learning in authentic, natural and ecological environments where they learn to identify, differentiate and interpret various landscapes, weather, plant and animal species and direction. This paper argues that a fully-fledged ecotourism practitioner cannot develop such skills through online learning. The foremost approaches in acquiring ecotourism knowledge and skills are fluid inquiry and project based (Coles et al., 2014; de Crom & de Jager, deWitt & Storksdieck, 2008; 2013; Hayes, 2009; Urias & Russo, 2009) with the digital resources used to document such knowledge for analysis and interpretation back in the lecture room
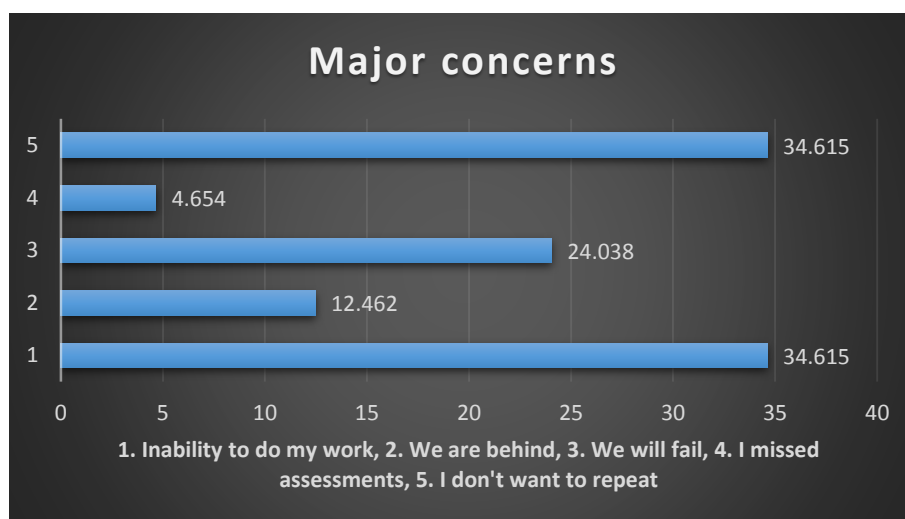

Figure 2. Major concerns

Their major concerns stemmed from inability to do their work because of challenges already mentioned, possibility of failing and having to repeat the level because some had missed some assessments, and that they were left behind their studies. To them online lectures did not equate to proper learning because it did not provide opportunities to do practical fieldwork. It is true that online learning was imposed on unprepared participants overnight resulting in such responses as: we cannot learn or perform this way, it is hard to cope, online learning is hard and frustrating, online learning is not for everyone, if this continues I will drop out and overall feeling that they had not learnt much in 2020. Their views were in line with Garrison's view (2012) that deep learning is collaborative and constructivist allowing to students to develop their own understanding of materials (Hayes, 2009) with online learning augmenting such experiences particularly in areas where there are no network connectivity challenges. Consequently, they could hardly wait for the lockdown to be over so they could learn again through field experiments, class discussions and engagement with other students as 88.6% of them claimed to have received no educational support at home.

Discussion

Elmer et al. (2020) make a strong case for social support enhanced by physical proximity, pleasant interactions, friendships, emotional support, informational support, and co-studying as contributors to reassurance in times of crisis. Wai (2019) views online learning as a threat to critical cognitive and non-cognitive developmental roles of universities, which supports WEF (2015) unique knowledge and skills to solve unprecedented global challenges required for 21st century, which determines the value of a university degree (Calderon & Sidhu, 2014). This paper supported an argument that has been going on for three decades regarding intelligence-endowment of different individuals implying that certain individuals would be more computer-intelligent than others. This was evidenced by the responses from a vast majority of the participants in this study who preferred F-T-F university education to online virtual, 94.3 arguing that they would have learnt better on campus which offers opportunities for group activities, field work, socialising, contact tutorials and easy consultation with the lecturers. Furthermore, certain areas such as mega cities and first world countries would be better prepared for online virtual education than deep rural areas, where a great majority of the participants (78.1%) in this study came from resulting in 91.4% facing network connectivity challenges.

One could easily argue that this is a matter of familiarity, which requires a mind shift, but there are many expertise and skills sets that cannot be acquired through online learning as per the argument advanced by Gardner and supporters of multiple intelligences. Also, there were other factors that made participants prefer F-T-F campus learning to online home learning such as shortage of space at home, role conflict, noise, poor network connectivity, shortage of data, lack of gadgets, shortage of materials, inaccess to group help, missed campus and field activities and others. Ecotourism promotes mainly the naturalistic intelligence, which according to Ningrum, Soesilo & Herdiansyah (2018) entails field recognition and classification of various species of flora and fauna, ability to detect patterns in nature (Watve & Watve, 2018), environmental awareness, understanding of negative impacts of human activities on nature and promotion of pro-environmental attitudes and behaviours. Gardner (1999); Hayes (2009) posit that the naturalistic intelligence is firmly entrenched in various other intelligences, meaning that this intelligence can be enhanced in collaboration with interpersonal, verbal-linguistic, mathematical-logical, visual-spatial, bodily-kinesthetic, intrapersonal, musical and existential intelligences as the department promotes through enquiry-based field activities.

Limitations and Future Studies

The study was limited by its case study cross-sectional design, which meant that the findings could not be generalised to other field, universities and regions with better access to technology and connectivity. The results tended to reflect the emotions of affected students, with very limited rationality. Future studies could focus on comparisons between pass rates prior to pandemic related lockdown, during the lockdown and post COVID-19 lockdown. It would also be interesting to know how universities will structure teaching, learning and assessment once the pandemic has passed.

Conclusion

This paper argues that while critical, as merging pedagogies and technologies is, online learning alone is not ideal for the acquisition of field and industry specific knowledge and skills required to solve 21st century problems as outlined by the WEF (2015). Mahaye (2020); Mtose (2020) postulate that for higher education the drift will be permanent as it necessitates post normal frames of reference that shift pedagogies to new transformed teaching, learning and assessment approaches to ensure that higher education is prepared for future setbacks. Some of the academic questions to

be asked as we navigate the new normal and prepare for the 'next normal' (Parkin & Brown, 2020, p.5) in our fluid spaces of teaching, learning and assessment include - the dangers of perceived cross-field relevance of online learning, possible obsolescence of contact lectures and repercussions for resident universities, capability of online virtual learning to cater for all intelligences and develop requisite 21ˢᵗ century and beyond skills, the challenge of putting students and their backgrounds first, ensuring that they are all on board and developing higher-order competencies and character qualities through alignment of technologies with learning objectives and critical cross-field outcomes.

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