Dr R.H. Moses
Senior Lecturer: Department of Performing Arts
School of Jazz and Popular Music
Tshwane University of Technology
Arts Campus, Pretoria, South Africa
(office) +27 12 3826604
email: mosesrh@tut.ac.za

COVID-19 lockdown music lessons: Digitalising for online music learning

Abstract

With the COVID-19 outbreak, universities worldwide have moved towards online learning or distance education. Despite pioneering work by distance learning institutions globally, the digital platform remains unexplored, particularly for online music teaching and learning. Face-to-face teaching for practical based subjects is challenging due to COVID-19 protocols.

Online teaching and learning tools are being designed in response to curriculum, programme delivery, and assessment. Music educators are entrusted with finding creative ways to address their unique challenges. This study examines whether online music programmes address the unique challenges of music students. The music department of a leading South African university of technology is the case study where the teaching model is being digitalised to combat online learning challenges. A SMART (**s**pecific, **m**easurable, **a**chievable, **r**ealistic, and **t**imely), stepwise, online lessons programme was designed to facilitate instrumental teaching during university closures and lockdowns.

The programme piloted in 2019 and was adapted according to stakeholder (students, teachers, curriculum experts) analysis. This programme provided insight on learning preferences, teaching techniques, assessment methods, online platform preferences, infrastructural availability, and challenges.

Results highlighted the improvement in success rate, peer learning, self-evaluation, self-learning, and student engagement. The results prompted the researcher to use this programme to provide online instrumental lessons to university music students. Due to its synchronous and asynchronous online instrument teaching approach, this programme transforms students' learning experience using digital technology and 4IR underpinnings. The programme can serve as a template for other practical subjects within various disciplines.

Keywords: Online learning, music education, industry 4.0, 4IR, student-centred learning

Introduction

In 2020, the COVID-19 pandemic sped up digital transformation and revolutionised digital influences at universities (Mhlanga & Moloi, 2020). Lockdown protocols and social distancing forced universities to switch to emergency remote teaching (Bozkurt & Sharma, 2020) to continue teaching and learning.

Although affluent South African universities could switch to online platforms, economically challenged universities faced numerous hurdles to switching from face-to-face teaching to online platforms.

Traditional music lesson teaching and learning models were adversely impacted because the face-to-face teaching approach could no longer be applied. Extension of the university

semester and makeup lessons proved inadequate, as students lost momentum in their learning.

An online teaching and learning tool was designed in response to the programme delivery, learning styles, and assessment methods. A flexible and relevant online music programme was designed, addressing the distinct challenges of this student profile. Student learning preferences, teaching techniques, assessment methods, online platform preferences, infrastructural availability, and challenges were considered. Therefore, this study seeks to address the research question: Can an online music programme address specific challenges of university music students?

Fourth industrial revolution (4IR) and university digitalisation

The fourth industrial revolution (4IR, industry 4.0) refers to the automation and digitalisation of work (Schwab, 2016). 4IR also affirms technological transformation, which results in new ways of 'perceiving, acting, and being' (Philbeck & Davis, 2018, p. 17) and in new ways in which technology is integrated within society (Davis, 2016). 4IR is considered an important global trend that will change the world of work and how people relate to technology.[1]

Learning with 4IR technology emphasises pedagogical approaches and learning activities towards achieving meaningful learning instead of focusing on technological tools used to achieve the task (Bozalek & Ng'ambi, 2015). By creating a digital learning environment (digital 4IR), students are the central focus of a 'technology-enabled-learner-centred' approach (Oke & Fernandes, 2020, p. 5).

The digitalisation of education involves using technology to improve and simplify technological infrastructure, as well as for pedagogical approaches and processes (Selwyn, 2016). Many universities use digital technologies to promote learning, encompassing a transformative learning and strategy agenda (Bozalek & Ng'ambi, 2015). Students use mobile technology, social media networking skills, and user-driven media initiatives for pedagogical exploration. Technology provides numerous opportunities to support flexible learning inside and outside the classroom (Bozalek & Ng'ambi, 2015).

Challenges with online learning at a university of technology

South African universities that lacked 4IR tools to enable online learning shut down during the lockdown necessitated by the COVID-19 pandemic (Mhlanga & Moloi, 2020). Subsequently, various digital learning platforms created by South African EdTech companies were investigated and implemented by the universities (Ngcamu, 2019). Although these platforms provided contemporary course content, access to digital tools and user-friendly technology favoured only economically stable students. Exorbitant data prices, unavailability of free wi-fi and mobile data inhibited previously disadvantaged students from gaining access to these platforms (Ngcamu, 2019).

As a university of technology (UoT)[2] that caters for the previously disadvantaged and underprivileged students, these music students' challenges hinge on a low socio-economic background and lack of infrastructure (Bridge, 2015). The majority of the students lack access to music instruments, smartphones, laptops and the internet. The bulk of the university's

[1] Key technologies include genetics, computer technology, nanotechnology, and biotechnology (Hirschi, 2018).

[2] Universities and universities of technology offer similar qualifications ranging from higher certificates to doctoral degrees. The distinguishing factor is that universities of technology focus on technology innovation and transfer and offer technological career-directed educational programmes (Bridge, 2015). A university's mandate is to offer pragmatic and career-directed programmes and training.

music students are funded by the National Student Financial Aid Scheme (NFSAS), which provides bursaries for tuition with limited funding for accommodation and books (NFSAS, 2020).

The majority of the music students have attended Quintile[3] 1 category schools located in communities with low average household incomes, high unemployment rates, and low literacy rates. In addition, these particular schools are associated with poor quality education (van Dyk & White, 2019).

The university music students require access to digital resources to participate in online teaching and learning. These resources include music learning tools, technological infrastructure[4], recording devices[5], music instruments, and practice space (Gonsalves, 2020; Naidoo, 2020). However, financial constraints restrict students' access to these resources required for effective online learning. In addition, the students are forced to use mobile-technology-based apps (WhatsApp, FaceTime), as the university lacks financial funding to assist with purchases of necessary online teaching and learning tools. Students require alternate electricity sources for powering electronic devices and internet technology to continue with online learning during electricity outages.

Theoretical framework

Lack of education funding in South Africa undermines the delivery of quality education (Mestry & Ndhlovu, 2014). Although the South African public school quintile ranking system aims to redress financial inequality to enhance the quality of teaching, the practical implementation creates difficulties for roleplayers (Van Dyk & White, 2019). The majority of university students attended lower-quintile-ranked schools and face socio-economic challenges pertaining to university admission. This article aims to ascertain the viability of an online music programme that addresses the specific challenges of music students.

This study was underpinned by a transformative framework that aimed to improve society through knowledge construction based on power and social relationships (Creswell, 2013). This study highlighted the low socio-economic background of the university music department's students and inequity of access to infrastructure necessary for effective online teaching and learning. This study advocates action through developing an online music-teaching programme that addresses the students' specific challenges.

The social constructivist approach focuses on the student's specific social context to understand their educational background and historical setting (Creswell 2013). Shulman's constructivist perspective to teaching and learning outlines that pedagogical content knowledge underpins the online music programme construct. Pedagogical content knowledge is an integration of pedagogical knowledge and subject matter knowledge. This teaching expertise and a recognition of the students' socio-economic background served as the pedagogical tool/construct (Cox, 1987) to develop the online music-learning programme.

---

[3] The quintile category indicates the socioeconomic status of a school by determining average household income, unemployment rates, and general literacy level in the school's geographical area. Quintile 1–3 represents poor schools and Quintile 4-5 are considered affluent schools (*Amended national norms and standards for school funding*, 2017; Graven, 2014; Hall & Giese, 2008; Mestry & Ndhlovu, 2014).

[4] Technological infrastructure - internet technology, high-end computers, MIDI keyboards, webcams, and headphones with built-in microphones, compatible software required to access zero-rated online learning platforms, and e-learning software.

[5] Recording devices - laptops, tablets, audio interfaces, microphones, high-resolution cameras, and recording software – Logic Pro, Final Cut Pro.

Methodology and data collection

The study used the qualitative approach to garner a rich description of a multifaceted phenomenon (Creswell, 2014). A case study method was used to investigate a phenomenon in the real-life environment (Yin, 2009). The case study centred around the music department of a leading South African university of technology in which the teaching model is digitalised to face the challenge of online learning. An exploratory research design was employed to gain information on a less-researched topic through systematic data collection (Given, 2008; Kumar, 2011). The constructivist approach was allowed for knowledge to be constructed through meaning and real-life experiences. This knowledge is fundamental in developing an online music-learning programme that caters for specific student needs (Leow et al., 2016). Underpinned by a transformative paradigm, the exploratory qualitative data provides insight into social justice issues and the needs of marginalised student populations (Mertens, 2007).

Data collection sources included literature, student feedback[6], a feedback-tracking tool (Appendix 1, 2, and 3), and interviews. Unstructured, informal interviews with pedagogues shed light on learning styles, teaching techniques, online platform preferences, and possible challenges. Students' online teaching preferences informed the framework and effectiveness of the innovation. Data was coded and securely stored in a database and students' anonymity and confidentiality was protected by not identifying their year group.

Written responses were not elicited from the students, as it was far more beneficial to allow for an environment of verbal engagement and self-reflection. This allowed students to comment and elaborate on each other's comments. Students with limited language ability were engaged to express themselves with verbal discussions, allowing for cross commentary that garnered richer data. Thematic content analysis coded the student responses into themes of opportunities, challenges, and best practices.

Literature review

Online music-learning literature reviewed for this study highlighted forms of online learning in the global and South African context. In developing an online music programme that addresses specific challenges of music students, themes were explored of university digitalisation, the fourth industrial revolution, and various online-learning approaches pertaining to instrumental music teaching.

Emergency remote teaching

In response to the educational crisis, online emergency remote teaching (ERT) was implemented (Bozkurt & Sharma, 2020). The primary purpose of ERT is to provide temporary access to teaching and learning quickly and reliably during the crisis. ERT uses remote teaching solutions and alternate instructional modes (Golden, 2020) for education as a substitute for face-to-face or blended learning. The premise is that once the crisis abates, the teaching environment will return to previous teaching formats (Hodges et al., 2020). ERT focuses on the students' varying needs and challenges, including learning contexts, availability, and accessibility of tools.

---

[6] The informal class discussion was part of the class activity following verbal engagement with students and comprised verbal responses. The feedback did not require consent from the students as it was part of a general class discussion. Furthermore, the feedback had no bearing on their assessment or marks and there was no unbalance in power relationships between the lecturer and the students. The feedback was considered a reflective process which was not part of the assessment criteria.

South African higher education online teaching and learning context

South African higher learning institutions were forced to switch from face-to-face classes to remote learning during the lockdown to curb the spread of the COVID-19 virus (Mhlanga & Moloi, 2020). Several affluent universities switched to remote online learning, using their pre-existing online platforms. Other universities and public schools had to shut down during the lockdown as they lacked 4IR technological infrastructure (Mhlanga & Moloi, 2020). Although remote learning provided flexibility for teaching and learning, the swift implementation of remote online teaching was dependent on funding, technology, connectivity, and accessibility.

Available funding to support online learning varies between higher education institutions, leading to disparities between online teaching and learning models. Online teaching and learning models were thus based on institutional financial support, student financial backgrounds, and accessibility of internet technology (Mhlanga & Moloi, 2020). Websites, Microsoft Teams, Skype, WhatsApp groups, and Zoom were the most popular internet tools for providing and facilitating remote learning (Mhlanga & Moloi, 2020).

Online learning and online courses

Online learning refers to web-based learning, e-learning, virtual learning, and internet-based learning (Keengwe & Kidd, 2010). Online learning embraces a wide variety of technological applications and platforms. Online learning and online courses in higher education encompass learner experiences, learning management systems, education theory, and pedagogy (Hansen & Imse, 2016; Ibrahim & Nat, 2019; Keengwe & Kidd, 2010). The method of delivery and content structure plays a crucial role in optimising the online learning experience.

Table 1 provides a brief outline of online learning, asynchronous learning, synchronous learning, and online courses (Barker, 2003; Browne, 2005; Hansen & Imse, 2016; Hrastinski, 2008; Milakovich & Wise, 2019; Schlesselmann, 2020; Thalheimer, 2017).

Table 1: Outline of online learning, synchronous, asynchronous, and online courses

Online learning	• Dynamic environments boast diverse pedagogical practices, including active learning and incorporating student-centred didactic approaches and techniques (Barker, 2003; Browne, 2005) • Alternative to traditional classroom teaching methods and settings • Flexible appeals to various types of learning styles – visual, auditory, and practical (Hansen & Imse, 2016)
Asynchronous learning	• Students are online when required • Students control learning pace – increases students' ability to process information and provide content-related responses (Milakovich & Wise, 2019) • Encourages cognitive participation – increased reflection and capacity to process information
Synchronous learning	• One-on-one and uses digital platforms to access online course content/media at the same time (Milakovich & Wise, 2019) • Increased psychological arousal, motivation, and convergence on meaning (Hrastinski, 2008)
Online courses	• Engaging and interactive • Increased interaction with the lecturer, students, and course material • Collaborative and flexible assessment methods (Schlesselmann, 2020)

- Teaching method takes precedence over the teaching modality
- Learning experience yield better results than face-to-face teaching (Thalheimer, 2017)

Blended learning

Blended learning is defined as a combination of face-to-face learning and web-based experiences (Ibrahim & Nat, 2019). A wide variety of teaching and learning environments are integrated, including asynchronous learning networks, web-based teaching platforms, and online learning tools. The challenges of this approach are limited access to technology and inadequate computer skills (Tshabala et al., 2014).

Self-regulated learning

Self-regulated learning is crucial to music practice. Achievement levels and success are based on practice time and commitment. Practice methods involved a level of self-assessment and correction that leads to deliberate practising (Hallum & Bautista, 2012), active student engagements, and student-controlled learning processes. Motivation is the essential element in self-regulation intervention programmes that improved academic performance (Dignath et al., 2008).

Student-centred learning

Student-centred learning or active learning engaged students with the subject content and encouraged students to control their learning. The teaching-and-learning and assessment strategies were adapted to suit the needs and abilities of the students (Brown, 2008). The skills required for the future success of music students are cultivated through peer evaluation, self-reflection, and problem solving. These activities form part of the student's music making (Hansen & Imse, 2016). A student-centred learning approach encourages lifelong learning and nurtures creativity and collaboration (Scott, 2011).

E-portfolio and assessment strategy

An electronic portfolio (e-portfolio) is a digital collection of content. An e-portfolio manages data and can be adapted to support learning (Abrami & Barrett, 2005). E-portfolios are used to recognise various learning styles of students and enhance their learning through self-reflection and self-regulated learning (Boulton, 3014; Yastibas & Yastibas, 2015).

Higher education institutions use e-portfolios as alternate assessment strategies (Van Wyk, 2017) since they allow for assessment flexibility. E-portfolios also serve as a record of evidence indicating knowledge and skills (Van Wyk, 2017), which in turn serves as an entrepreneurial tool (Mapundu & Musara, 2019). Ongoing feedback (diagnostic) and continuous monitoring of tasks are assessed according to specific evaluation criteria (Van Wyk, 2017).

Online music-teaching tools

Online music-teaching tools are an invaluable resource required for online learning. A selection of online music-teaching tools is based on availability, functionality, teaching efficacy, and integration with existing music software (Brook & Upitis, 2015). Self-regulation, self-learning, and student-driven learning are key learning approaches in online learning programmes (Brook & Upitis, 2015).

Internet MIDI, FaceTime, and method books are used as part of synchronous teaching approaches and create opportunities shaped by the online medium. Although synchronous online teaching approaches provide piano lessons to disadvantaged populations in remote areas, using Skype videoconferencing for music lessons was functional but not equivalent to

face-to-face instruction (Dammers, 2009). Videoconference-based teaching is more intense, and the time delay hinders student and teachers from performing together (Sture Brändström, 2012). Other teaching challenges include complications related to lack of knowledge of equipment and technology (Kruse et al., 2013), quality of videoconferencing equipment (Lancaster 2007), and latency dependent on internet bandwidth (Riley et al., 2016).

Discussion

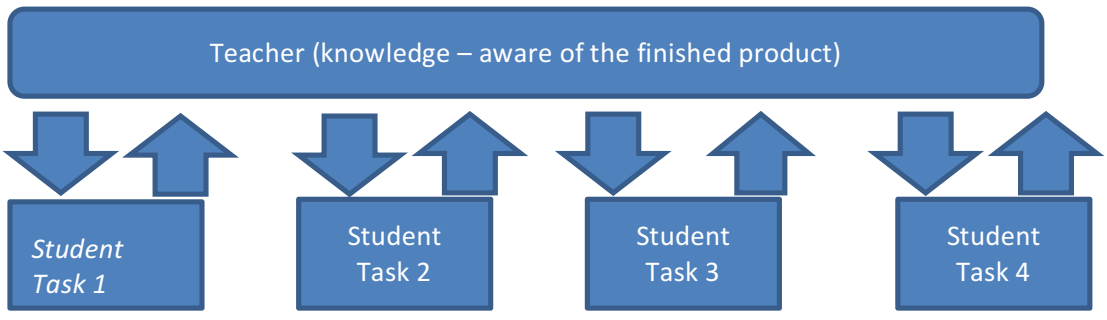
Traditional instrumental music teaching

Traditional learning environments in the western world are confined to a specific location, with teachers and students both present. The learning environment is teacher-controlled and presented in real-time using linear teaching methods (Dabbagh & NannaRitland, 2005). The music lesson format follows the master-apprentice model. Students and teachers meet weekly (Harwood 2007), where guidance and feedback are provided during the lesson. Teaching is structured into bite-size chunks to minimise overwhelming the students with information, promoting student engagement and motivation (Harwood, 2007).

Jazz teaching and learning tools pioneer technology-based education strategies that provide students with access to the actual music content (source) rather than mediated sources. Jazz ensemble and instrumental teaching and learning follow an apprenticeship model, incorporating music technology to analyse recordings and performances. Transcription is a process involving listening and copying aspects of performances and is a key tool for learning jazz styles and developing the ability to improvise. Transcription methods involve converting analogue audio to digital formats. This method has evolved from using cassette tape, then LPs, then CDs (manual playback to loop sections) to format and convert analogue audio to MP3 and waveform audio files (WAV) using music-recording software (LogicPro, ProTools) for flexible manipulation. Advancements in music technology include transcription and notation software[7] that are used to convert various audio formats into sheet music. Built-in editing tools adjust notes, beats, tempos, and time signatures to suit the range of the instrument and student ability.

Traditional teaching process

Figure 1: The traditional teaching and learning process



The traditional hierarchical teaching approach shows the teacher as the knowledgebase and controlling the learning process. Only the teacher is aware of the tasks and final product and sets out each task for the student (set of instructions).

[7] Notion 6, MuseScore, Sibelius, Finale PrintMusic, Forte Home, AnthemScore.

Process:

- Teacher sets out the tasks for the student.
- Student completes the task and relays it back to the teacher.
- Teacher then actions the next task.

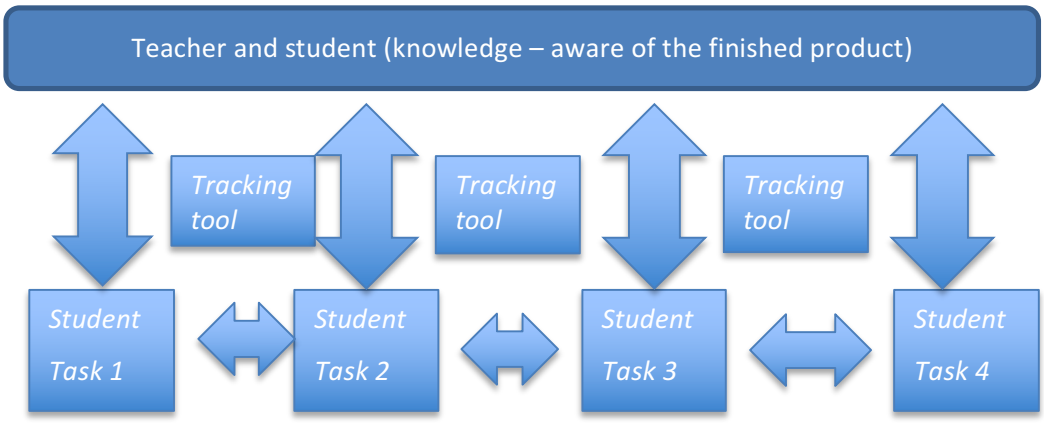
The student is unaware of the relationship between the tasks and final product during the traditional online teaching and learning method.

Industry 4.0 SMART online teaching process

Majority of TUT music students hail from historically disadvantaged communities, low socio-economic background and lower quintile ranking schools. As a result, these students are underprepared for university education. The instructional design used a developmental approach to accommodate the deficiencies from their schooling system.

The majority of music students at the university are funded by the National Student Financial Aid Scheme (NFSAS). The students lack access to music instruments, smartphones, laptops, and the internet. A SMART (**s**pecific, **m**easurable, **a**chievable, **r**ealistic, and **t**imely) stepwise online lessons programme was designed to facilitate instrumental teaching during university closures and lockdowns. The SMART programme draws on the industry 4.0 manufacturing model in which the knowledge is decentralised, autonomous, and self-optimising, thereby promoting a stepwise student-centred learning approach.

Figure 2: Industry 4.0 manufacturing model adapted and applied to a SMART online teaching and learning method



The industry 4.0 manufacturing model showed a student-centred learning approach. The student is included in the knowledgebase, is cognisant of the tasks, and how the tasks relate and work in conjunction with each other. The student-controlled the learning pace (self-learning) and teacher interaction. The tracking tool (Appendix 1, 2, and 3) serves as a feedback mechanism (teacher) for each task and leads to self-organised and self-regulated learning.

Self-organised and self-regulated learning process

- Teacher provides all the tasks in the stepwise lesson plan[8] (Appendix 1, 2, and 3) to the student.
- Student uploads videos of various weekly tasks (as per the stepwise lesson plan) to a student portal (e-portfolio). Student uses mobile technology for asynchronous lessons

[8] A stepwise lesson plan is provided by the teacher that consists of at timetable, learning material, demonstrational videos, and YouTube links.

and track their progress using the stepwise lesson plan and a feedback tool (Appendix 1, 2, and 3). Teacher provides feedback on the performance and suggestions for the next task. Teacher uses continuous assessment to evaluate student's progress based on weekly uploads to an e-portfolio, including using a feedback mechanism and peer assessment. The teaching and learning activities are based on the constructive alignment model, where the intended learning outcomes are clearly stated and aligned to teaching and learning activities, as well as the assessment method.

Traditional versus online music programmes

The literature reviewed outlined the best practices of online teaching and online learning music programmes to address the research question of whether an online music programme can address specific challenges of the university music student. These best practices addressed the specific challenges of the music students. In doing so, the best practices formed the basis of an online learning music programme.

The literature reveals that traditional synchronous music lessons are restrictive and time consuming. Synchronous online learning encourages one-on-one participation but requires the teachers and students to be available simultaneously. The asynchronous online learning[9] approach is less dependent on technological infrastructure and internet technology than the synchronous approach.

Asynchronous student-centred learning enables students to be in control of their learning. E-portfolios are an effective tool for online learning and assessment for student-centred learning. Students record their lessons on Zoom, which serves as a reference tool for self-learning and practising.

Blended learning allows the students to continue learning, using various synchronous platforms and asynchronous tools (Milakovich & Wise, 2019).

SMART stepwise online lessons

The SMART (**s**pecific, **m**easurable, **a**chievable, **r**ealistic, **t**imely) stepwise online lessons approach enhances online learning by providing a graded stepwise approach to learning. Lesson plans (Appendix 1, 2, and 3) include short exercises uploaded as short video clips on mobile platforms[10]. These video clips and feedback tools (Appendix 1, 2, and 3) effectively monitor student progress and provide diagnostic feedback. Lecturers upload demonstrative videos to the zero-data-rated university online platforms and mobile platforms. Self-regulated, peer learning, and active learning approaches should underpin teaching and learning strategies.

The SMART stepwise online lesson approach can be applied to teaching and learning practical modules within various disciplines and programmes. Following consultation with jewellery design lecturers, the SMART model was adapted for designing a commercial jewellery range as part of a project in the Jewellery Design subject (Appendix 2). The stepwise lesson plan and feedback-tracking tool informs the student of the smaller tasks and provides background to the design process, culminating in the development of design principles and elements. The

[9] Asynchronous course content enables students to engage with the material several times regardless of internet connectivity (Schelesselman 2020).

[10] Music students prefer using mobile technology platforms (WhatsApp, Google Drive, Dropbox, Zoom, and FaceTIme) at base level due to limited access to computers, music software, and recording equipment. Although these platforms are functional, they are limited for providing feedback on instrumental performance techniques.

tracking tool outlines the five tasks, namely research, concepts, design development, technical information, and rationale. The weekly submissions and feedback ensure that the weekly learning outcomes are completed.

The SMART stepwise online learning model can be applied to the short learning programmes offered at a university of technology as part of entrepreneurship in the arts, namely batik, tie and dye, footwear design, and fundamentals of dressmaking/sewing skills. The SMART stepwise model was incorporated into the dressmaking process (Appendix 3) from the inception to completion stages of a garment. The stepwise lesson plan and tracking tool outline the five tasks required to design and sew an apron with a pocket.

The SMART model can also be adapted to photographic techniques and information technology modules. These modules include processes of problem solving, practical procedures, and the application of appropriate techniques to accomplish the given task. A projects and assignments e-portfolio will serve as a continuous assessment tool.

Student reflections

Student feedback on the pilot project highlighted the flexibility and accessibility of the online learning approach. Exposure to various styles of learning approaches enhanced their learning experience. Students were able to integrate the teaching and learning approaches and develop their skills with constant lecturer feedback. Access and student success rates are improved when incorporating mobile technology as part of digital learning processes.

Conclusion

Online music-learning programmes provide an alternative teaching mode to ensure the continuation of academic programmes during times of closure, social distancing, and lockdown. Online learning music programmes provide a non-restrictive alternative to the traditional music lesson when students have sufficient access to technology.

The decentralised and self-optimising learning approach of online learning music-teaching programmes is relevant for addressing student challenges. The student learning experience is enhanced, as online learning requires student engagement and self-regulation. Online learning music-teaching tools, self-assessment, and e-portfolios contribute positively to programme delivery and assessment strategies.

Online learning music programmes must address the specific needs and challenges of students. The one-size-fits-all approach renders this learning mode irrelevant (Gillet- Swan, 2017). In the South African context, access to technological infrastructure is crucial for online learning programmes to be successful (Mhlanga & Moloi, 2020).

References

Abrami, P. & Barrett, H. (2005). Directions for research and development on electronic portfolios. *Canadian Journal of Learning & Technology*, *31*(3), 1–15. https://doi.org/10.21432/t2rk5k

Barker, A. (2003). Faculty development for teaching online: Educational and technological issues. *Journal of Continuing Education in Nursing*, *34*(6), 273–278.

Boulton, H. (3014). ePortfolios beyond pre-service teacher education: a new dawn? *European Journal of Teacher Education*, *37*(3), 374–389.

Bozalek, V. & Ng'ambi, D. (2015). The context of learning with technology. In W. R. Kilfoil (Ed.), *Moving beyond the hype: A contextualised view of learning technology in higher education* (pp. 3–7). Universities of South Africa.

Bozkurt, A. & Sharma, C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education*, *15*(1), 1–6.

Bridge. (2015). *Linking innovation in education*. Bridge.Org.Za. https://www.bridge.org.za/knowledge-hub/psam/he/universities-of-technology/.

Brook, J. & Upitis, R. (2015). Can an online tool support contemporary independent music teaching and learning? *Music Education Research*, *17*(1), 34–47. https://doi.org/10.1080/14613808.2014.969217

Brown, J. K. (2008). Student-centered instruction: Involving students in their own education. *Music Educators Journal*, *94*(5), 30–35. https://doi.org/10.1177/00274321080940050108

Browne, E. (2005). Structural and pedagogic changing in higher education: A case study approach. *Journal of Further & Higher Education*, *29*(1), 49–59.

Cox, M. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, *57*(1), 1–22.

Creswell, J. (2013). *Qualitative inquiry research design. Choosing among five approaches*.

Creswell, JW. (2014). *Research design: Qualitative, quantitative and mixed methods approaches*. Sage.

Dabbagh, N. & NannaRitland, B. (2005). *Online learning: Concepts, strategies and application*. Upper Saddle River.

Dammers, R. J. (2009). Utilizing internet-based videoconferencing for instrumental music lessons. *National Association for Music Education*, *28*(1), 17–24.

Amended national norms and standards for school funding, Government of South Africa ___ (2017).

Davis, N. (2016). *What is the fourth industrial revolution? World Economic Forum* (p. 11). https://www.weforum.org/agenda/2016/01/what-is-the-fourth-industrial-revolution/

Dignath, C., Buettner, G. & Langfeldt, H.-P. (2008). How can primary school studentslearn self-regulated learning strategies most effectively? A meta-analysis on self-regulation training programmes. *Educational Research Review*, *3*(2), 101–129.

Gillet- Swan, J. (2017). The challenges of online learning: Supporting and engaging the isolated learner. *Journal of Learning Design*, *10*(1), 20–30.

Given, L. M. (Ed.). (2008). *The Sage Encyclopedia of qualitative research methods*. Sage.

Golden, C. (2020). Remote teaching: The glass half-full. *Educause Review*, *March*. https://er.educause.edu/blogs/2020/3/remote-teaching-the-glass-half-full

Gonsalves, N. (2020). *Interviewed by Roland Moses*.

Graven, M. H. (2014). Poverty, inequality and mathematics performance: The case of South Africa's post-apartheid context. *ZDM - International Journal on Mathematics Education*, *46*(7), 1039–1049.

Hall, K. & Giese, S. (2008). Addressing quality through school fees and school funding. In S. Pendlebury, L. Lake & C. Smith (Eds.), *South African child gauge* (pp. 35–40). Children's Institute, UCT.

Hallum, S. & Bautista, A. (2012). Processes of instrumental learning: The development of musical expertise. In G. McPherson & G. Welsh (Eds.), *The Oxford handbook of music education, Volume 1* (Vol. 1, pp. 658–676). Oxford University Press.

Hansen, D. & Imse, L. (2016). Student-centred classrooms. *National Association for Music Education*, *103*(2), 20–26.

Harwood, E. (2007). Artists in the academy: Curriculum and instruction. In L. Bresler (Ed.), *International handbook of research in arts education* (pp. 313–330). Springer.

Hirschi, A. (2018). The fourth industrial revolution: Issues and implications for career research and practice. *Career Development Quarterly*, *66*(3), 192–204. https://doi.org/10.1002/cdq.12142

Hodges, C., Moore, S., Lockee, B., Trust, T. & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hrastinski, S. (2008). Asynchronous and synchronous e-learning. *Educause Quarterly*, *4*, 51–55.

Ibrahim, M. & Nat, M. (2019). Blended learning motivation model for instructors in higher education. *International Journal of Educational Technology in Higher Education*, *16)12*, 1–21.

Keengwe, J. & Kidd, T. (2010). Towards best practices in online learning and teaching in higher education. *MERLOT Journal of Online Learning & Teaching*, *6*(2), 533–541.

Kruse, N., Harlos, B., Callahan, S. & Herring, R. (2013). Skype music lessons in the academy: Intersections of music education, applied music and technology. *Journal of Music, Technology & Education*, *6*(1), 43–60.

Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners*. Sage.

Leow, F. T., Neo, M. & Hew, S. H. (2016). Investigating the key attributes to enhance students' learning experience in 21st century class environment. *Electronic Journal of E-Learning*, *14*(4), 244–256.

Mapundu, M. & Musara, M. (2019). E-portfolios as a tool to enhance student learning experience and entrepreneurial skills. *South African Journal of Higher Education*, *33*(6), 191–214.

Mertens, D. M. (2007). Transformative paradigm: Mixed methods and social justice. *Journal of Mixed Methods Research*, *1*(3), 212–225.

Mestry, R. & Ndhlovu, R. (2014). The implications of the national norms and standards for school funding policy on equity in South African public schools. *South African Journal of Education*, *34*(3), 1–11. https://doi.org/10.15700/201409161042

Mhlanga, D. & Moloi, T. (2020). COVID-19 and the digital transformation of education: What are we learning on 4IR in South Africa? *Education Sciences*, *10*(7), 1–11. https://doi.org/10.3390/educsci10070180

Milakovich, M. E. & Wise, J.-M. (2019). *Digital learning: The challenges of borderless education*. Edward Elgar Publishing.

Naidoo, C. (2020). *Interviewed by Roland Moses*. Transcription.

NFSAS. (2020). *DHET bursary scheme*. NFSAS.Org.Za. https://www.nsfas.org.za/content/bursary-scheme.html

Ngcamu, B. S. (2019). *Digitalising South African universities: Exploring benefits, barriers and risks*. Intechopen. https://doi.org/10.5772/intechopen.86693

Oke, A. & Fernandes, F. A. P. (2020). Innovations in teaching and learning: Exploring the perceptions of the education sector on the 4th Industrial Revolution (4IR. *Journal of Open Innovation*, *6*(31), 1–22.

Philbeck, T. & Davis, N. (2018). The fourth industrial revolution: Shaping a new era. *Journal of International Affairs*, *72*(1), 17–22. https://doi.org/10.2307/26588339

Riley, H., MacLeod, R. B. & Libera, M. (2016). Low latency audio video: Potentials for collaborative music making through distance learning. *Update: Applications of Research in Music Education*, *34*(3), 15–23. https://doi.org/10.1177/8755123314554403

Schlesselmann, L. S. (2020). Perspective from a teaching and learning center during emergency remote teaching. *American Journal of Pharmaceutical Education*, *84*(8), 1042–1044.

Schwab, K. (2016). *The fourth industrial revolution*. Crown Business.

Scott, S. C. (2011). The three artistic processes: Paths to lifelong 21st-century skills through music. *National Association for Music Education*, *97*(4), 9–13.

Selwyn, N. (2016). *Education and technology: Key issues and debates*. Bloomsbury.

Sture Brändström, C. W. E. L. (2012). Developing distance music education in Arctic Scandinavia: Electric guitar teaching and masterclasses. *Music Education Research*, *14*, 448–456. https://doi.org/10.1080/14613808.2012.703173

Thalheimer, W. (2017). *Does eLearning work? What the scientific research says! Work-learning research website*. WorkLearning.Com. https://www.worklearning.com/wp-content/uploads/2017/10/Does-eLearning-Work-Full-Research-Report-FINAL2.pdf

Tshabala, M., Ndeya-Ndereya, C. & Merwe, T. (2014). Implementing blended learning at a developing university: Obstacles in the way. *The Electronic Journal Of*, *12*(1), 101–110.

Van Dyk, H. & White, C. J. (2019). Theory and practice of the quintile ranking of schools in South Africa: A financial management perspective. *South African Journal of Education*, *39*(Supplement), 1– 9.

Van Wyk, M. (2017). An e-portfolio as empowering tool to enhance students' self-directed learning in a teacher education course: A case of a South African university. *South African Journal of Higher Education*, *31*(3), 1–18. https://doi.org/10.20853/31-3-834

Yastibas, A. E. & Yastibas, G. C. (2015). The use of e-portfolio-based assessment to develop students' self-regulated learning in English language teaching. *Procedia - Social and Behavioral Sciences*, *176*, 3–13. https://doi.org/10.1016/j.sbspro.2015.01.437

Yin, R. (2009). *Case study research: Design and methods* (4th ed.). Sage.

Appendix 1: Sample lesson 1 - music

Lesson 1	
Tenor Madness – Sonny Rollins *Tranes Blues* – John Coltrane *Blue Monk* – Thelonius Monk	
Sonny Rollins Background: Musical (How did he learn to play his instrument? How many instruments did he play?)	
List the Instrument/s :	
Compositions:	
Recordings:	
Personnel (musicians in his band):	
Style/s:	
YouTube.com (private channel with demonstrative videos)	
What you will learn • Sonny Rollins • Blues history • Blues form • Melody • How to improvise using the blues scale	

Appendix 1: Tracking tool

Tracking tool – music							
Date	**Task 1 Melody 8 bars**	**Task 2 Chord 8 bars**	**Task 3 Chord tones**	**Task 4 Solo**	**Listening**	**Accompaniment**	**Student feedback**

Appendix 2: Sample lesson 2 – jewellery design

Lesson 1	**Commercial jewellery range**
Background: What is commercial jewellery? What are all the specifications? What type of pieces are in a jewellery range? Types of semi-precious stones?	
Research:	
Concept designs:	

Design development:	
Technical information:	
Rationale:	
PPT with images of commercial jewellery designs	
What you will learn • Gathering of sufficient and applicable research • Commercial design process • Wearability • Design specifications • Development of design elements and principles • Technical information • Writing a rationale	

Appendix 2: Tracking tool

Tracking tool							
Date	**Task 1 Research**	**Task 2 Concepts**	**Task 3 Design development**	**Task 4 Technical information**	**Task 5 Rationale**	**Submission**	**Student feedback**
Week 1							
Week 2							

Appendix 3: Sample lesson 3 – fashion design

Lesson 1	**Fundamentals of dressmaking/sewing skills**
Designing and sewing an apron	
Equipment selection:	
Pre-shrinking of fabric and removal of creases:	
Design of pocket:	
Design of apron:	
Cutting of pocket:	
Cutting of apron:	
What you will learn Correct use of sewing equipment Pre-shrink fabric Remove creases Cut different fabric pieces Stitch a patch pocket and apron	

Appendix 3: Tracking tool

Date	Week 1	Week 2	Week 3	Week 4
Task 1 Equipment				
Task 2 Pre-shrinking fabric				
Task 3 Cutting of pocket				
Task 4 Cutting of apron				
Task 5 Stitching				
Submission				
Student feedback				