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## Paradigm Shift in Education in Teaching Learning in Higher Education During Lockdown Period of Covid-19

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**Abstract:** The study aims to identify social, intellectual, and conceptual structures along with key areas, contributors, current dynamics, and suggest future research directions in the field of engagement with e-learning systems. An objective analysis of a sample of 358 articles taken from the Web of Science database, supported by subjective assessments based on the research, focused on the integration of management into e-learning domain. Citations and page rank metrics were used to identify the most influential papers along with most influential authors. To understand the intellectual structure of the research area, a co-citation network was developed. The study may help to explore effective ways of delivering education during a crisis, while also taking a sustainable approach to the promotion of education through online methods. By understanding the behavior of learners towards various forms of content delivery, policy makers at national level can develop a framework to implement it nationwide. The Covid-19 pandemic has created the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries. Closures of schools, institutions and other learning spaces have impacted more than 94% of the world's student population. This has brought far-reaching changes in all aspects of our lives. Social distancing and restrictive movement policies have significantly disturbed traditional educational practices. Reopening of schools after relaxation of restriction is another challenge with many new standard operating procedures put in place. Within a short span of the Covid-19 pandemic, many researchers have shared their works on teaching and learning in different ways. Several schools, colleges and universities have discontinued face-to-face teachings.

**Keywords:** Higher education, Covid-19, E-learning, teaching-learning, Education System, Online Engagement, Technology Video Streaming

### 1.1 Introduction

The impacts and effects of coronavirus disease in 2019 (COVID-19) are growing with unconditional boundaries and destination. It began in China, with prominent steps all over the world, though was not seen at first to be very scary or as devastating as it has become today with a more devastating second wave that has spread across the community at large. It has immensely affected human health as well as the economy and development of countries globally [1].

The action of the disease caused by the virus is unstoppable as it transmits via human-to-human interaction; non-immunity to this particular virus has fueled rapid transmission. It was declared a public health emergency of international concern by the World Health Organization (WHO) on 30 January 2020 [2]. However, as a preventive measure and to slow down the infection rate, various guidelines were issued by the WHO and respective nations that include lockdown, social distancing, quarantine, self-hygiene, isolation, working from home, and staying home, at a colossal economic developmental cost. The impact also directly falls on the education system, when all the schools and other educational institutions were shut for a couple of months. The United Nations Educational Scientific and Cultural Organization (UNESCO) reported that overall, 290 million students across 22 countries have been severely impacted by their education system [3]. In India, about 1.6 million school-going students and 2.6 million graduating students have been affected, with virtual education in place since the beginning of the pandemic [4]. The widespread proliferation of COVID-19 worldwide stimulated the need to amend and reassess the conventional mode of education. Educational experts and the government are focusing on digital education as a viable solution over conventional teaching methods. The UNO and several government policies prompted the beginning of online education for students globally. With a second wave present for several months, there has been increasing use of teaching-learning through online mode because of the non-operation of schools, colleges and universities for an indefinite time and discontinuation of face-to-face teaching [5]. The COVID-19 pandemic has delivered us with an opening to flag the way for acquainting ourselves with digital learning [6]. The use of precise and applicable pedagogy with appropriate tools for online education depends on the proficiency of the teacher and student as well as the platforms used that include amalgamated communication and cooperation platforms. The most widely used are Microsoft Teams, Google Classroom, Zoom, and WebEx with the support of sharing contents in terms of video, documents, teaching materials, and others [7]. These also allow the tracking of student learning and assessment by using the assessment of various forms. Several whiteboard software and web conferencing tools that have gained attention during this crisis include Go Meet, Realtime Board, ezTalks Meeting, Zoom, AWW app, Web Whiteboard, Whiteboard Fox, Microsoft conferencing, Cisco WebEx Meeting, Google Hangout meets, Microsoft Teams, join.me, Cisco Jabber, iMeet, Electromeeet, Lifesize, Fuze, Adobe connect and Go To Meeting, etc. These platforms have been used by educators to provide classroom learning on an online mode of teaching. Most whiteboard software tools are freely available with limited features; some have premium versions (paid version) with all the features set. The educator chooses their software as per the requirements, such as the number of students, number of hosts, working hours, data transfer, and time duration. Apart from college and school teaching, many educational platforms provide tuition and extraneous courses such as Cue Math, Vedic Math, English speaking courses, Simplilearn teaches cyber security, Cloud, DevOps, Artificial Intelligence and Data Science, and many other online courses to provide valuable education.

In this paper, text mining is performed to analyse the most trending patterns of word and phrases during the pandemic, keeping education prospects as the focus. Moreover, data on internet search, social media [8], and Google analysis [9] have been used to mine information regarding the topic and analyze the leading aspects in terms of word search patterns and online platforms used throughout the pandemic. In this work, the authors have aimed to seek trend analysis on online platforms preferably used in the Indian education system. The authors have explored the Google trend on different learning platforms such as Zoom, WebEx, Google Meet, Microsoft, etc. The trend of using the top-rated online education platforms, namely Byju's, Vedantu, Whitehat Junior, and Khan Academy for school students and Unacademy, Udemy, Syamam and Edx for UG and PG level courses were considered. Analysis and inspection of the Google trends of last year (15 February 2020 to 15 February 2021) on the different online platforms are presented to show how online platforms have grown due to the pandemic and its social and economic impact in the



country. The increase in Google trends explicitly symbolizes the perception and work initiated, delivered and commissioned in various parts of the world [10,11].

This study majorly focused on the adoption and validation of various online educational platforms and presents the inevitability of various psychological distresses that are causing additional health damage and adverse life satisfaction among students. A comprehensive review of different virtual classroom platforms has been performed based on Google trend analytic to put across factors, outside of epidemic symptoms, that have impacted the lives of students during the COVID-19 pandemic. The authors have also analyzed a data set called the COVID-19 Open Research Data set (CORD-19), which is a source of more than 400,000 scholarly articles, and examine the text patterns and psychological effects after understanding the student mental conditions. User analysis of different platforms has been performed to identify the popularity of individual learning platforms, and it uncovered a far-ranging consequence with the reduction in the mental well being of students due to the current pandemic.

### **1.2 Programmes and policy of the government of India on online teaching-learning in HEIs**

The government of India started thinking gravely on this matter with emphasizing on ICT and use of online education as the part of compulsory teaching-learning process at tertiary level. Moreover, it is reflected on preparing draft new education policy 2019 that has been regarded as a proactive and highly techno-efficient step in the time of this pandemic. Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) is a programme or Massive Open Online Courses (MOOC) platform initiated by the government of India hosted online courses in different quadrants. The SWAYAM PRABHA is a group of 32 DTH channels dedicated to telecasting of high-quality educational programmes throughout the week. Annual Refresher Programme in Teaching (ARPIT) is an online professional development programme launched by the MHRD on November 13, 2018 using SWAYAM platform. Another initiative of MHRD was e-PG Pathshala run by the University Grants Commission (UGC) that provided high-quality curriculum-based and interactive e-content in 70 subjects across all disciplines. e-Pathshala is a portal jointly run by the MHRD and National Council of Educational Research and Training (NCERT) launched on November 7, 2015, that provided educational resources for teacher educators, teachers, research scholars, students and parents through an online learning platform. Therefore, it can be said that we were not unaware of the challenges and prospects of online education.

India's apex regulatory body of higher education, UGC, has taken the present educational scenario very seriously and put some efforts proactively to resolve the deadlock of completing courses and examinations in on-going semesters as well as issued circular regarding the academic calendar after the recommendations of one of the committees constituted by UGC itself. It has also become mandatory for all the universities in India to complete the 25% syllabus through online teaching mode and 75% face-to-face interaction [12]. The educational scenario of the post-COVID-19 outbreak would not be easy to manage teaching-learning situations without using online teaching platforms rigorously. Having seen the fearsome monster of corona virus, it can be anticipated that in the upcoming time student would face multiple challenges of educational hardships including quality education, hands-on experience, laboratory work, library visit, peer tutoring, remedial teaching, research and innovation. Hence, the tentative solution of post-COVID-19 educational tantrums is to maintain the equilibrium of online and offline learning classes (hybrid mode).

Implementation of online teaching-learning in HEIs



There are some difficulties felt in the implementation of the change process in the education system that has been arisen after COVID-19 crisis; these difficulties are related with the novel perspectives of online education and their technological complexities. Earlier to this pandemic, online education is considered as the education provided by the open universities in India. But in COVID-19 induced time, online teaching-learning became a massive challenge to deal with, and stakeholders are not potentially fit to adjust with the sudden educational change as they are not technologically competent to embrace the current situation. Therefore, for successful implementation of educational change (in this case, it refers to the shift from traditional teaching-learning methods to online teaching-learning methods), implications of change need to be addressed.

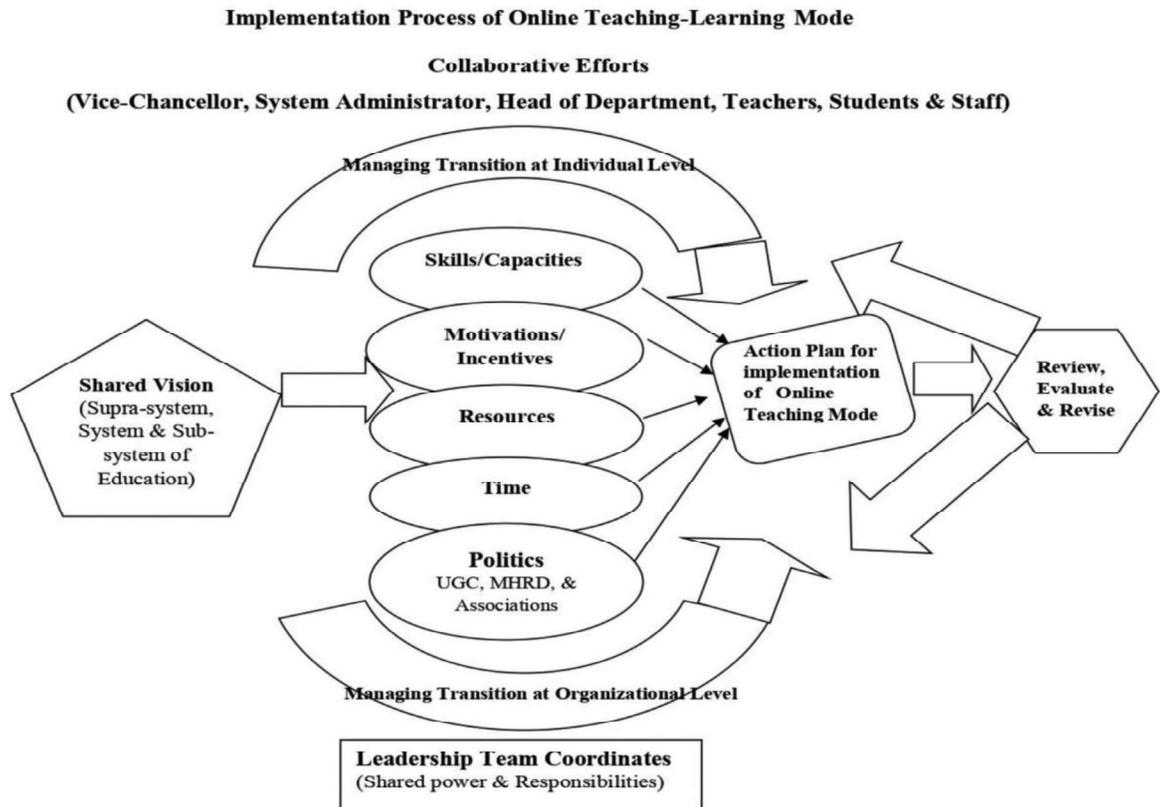


Fig. 1. Represents the conceptual model of the implementation process of online teaching-learning Source: Adapted from (Speck, 1996)

The Fig. 1 described how to decide the implementation process of online teaching-learning. The journey begins from the collective vision of UGC and MHRD (supra-system), University and Colleges (system), and different academic departments (sub-system) in favour of implementing online teaching-learning in the education system. In the face of COVID-19, the shared vision of education system realized that during the pandemic period, teachers and students are motivated to adapt online teaching-learning platforms in fulfilling the current educational needs. Everyone, either teachers or students, were friendly skilled in using social media app viz. WhatsApp, Facebook, Twitter, Instagram,



which turned into smooth facilitation of using online educational platforms such as ZOOM, Cisco WebEx, Google Meet etc. as a sign of positive transfer of learning.

Also, there are some useful educational apps such as Office 365, Google classroom and much more user-friendly videoconferencing app that can be downloaded free of cost and easy to use [13] so to some extent, it seems that there is no reason to get into a panic to get new technology all of sudden as some of the apps are already embedded in our HEIs. Majority of stakeholders possessed smartphones and only considerable numbers having laptops are the needed resources to implement online teaching-learning. Mizoram University has its ICT centre and LMS that helps in seamless monitoring of online teaching-learning modes. Central and State governments were unanimously agreed upon implementing online education across the country, keeping in mind the need of the hour. Various national, state and university level teachers' and students' associations were half-heartedly and hesitatingly supported the vision of online teaching-learning modes with the mix bags of opinion as a result of curiosity to trial new technology and the new mode of the teaching-learning process in the education system; it is due to the lack of preparedness, orientation and incentives of stakeholders in using online mode of teaching. The action plan was prepared, keeping in view of our readiness for online teaching mode, drive for change in this pandemic and availability of resources for implementing online teaching mode. To go with the action plan, teachers prepared and trained themselves independently to be accustomed to the technology required in using online teaching modes. At the university level, system administrator and Information & Communication Technology (ICT) experts provided necessary assistance to stakeholders and managing the change process. However, many pieces of research have been conducted over online teaching and learning and its effectiveness, no such studies conducted during COVID-19 lockdown period. Hence, the researcher insightfully gets interested in doing this study with the following objectives.

## 2.1 Literature Review

### 2.2 The Importance of Education Management Systems

The need for efficient data processing has been the expectation of most educational institutions, including schools. MIS are seen to have the potential to make significant contributions to teaching, learning and administration in schools. By providing reliable and accurate data, it is anticipated that the deployment of MIS in educational management will play an important role in the decentralization process by helping to ensure that the education provision becomes more efficient and responsive to users. MIS are being used by schools to support a range of administrative activities, including attendance monitoring, assessment records, reporting financial management and resource and staff allocation. These systems are distinct from other information systems in that they are designed to be used to analyze and facilitate strategic and operational activities in the organization [14]. The use of computers and technologies in educational institutes was mainly to store student and personal data [15]. However, Visscher believes that MIS can provide administrators and teachers with the information required for informed planning, policy making and evaluation. It is claimed that MIS have changed school management in the areas of leadership, decision-making, workload, human resources management, communication, responsibility and planning. These systems can assist the school head in determining the aims of the school, formulating strategic plans, distributing resources and evaluating staff performance as well as organizational success [16].

Zain et al. [17] investigated the impact of ICT on management practices in smart schools in Malaysia. Their analysis revealed some positive changes including the enrichment of ICT culture in schools, better accessibility to information, more efficient administration and higher utilization of school resources. The challenges encountered by the



participants' schools were time constraints, higher administrative costs, negative acceptance-support from untrained staff, abuse of the ICT facilities and problems related to the imposed rigid procedural requirements. A reduction in workload, beneficial impact on time management and improvement in the quality of reports have been highlighted as major impacts of MIS on school administration and management. Some studies show that as staff in schools have acquired and developed ICT skills and confidence in using the technologies, they have experienced a reduction in some aspects of their workload. ICT use was valued by senior management in developing school systems for administration and easing management tasks [18]. The use of technologies has made administrative work easier with regard to accounts, attendance data and the sharing of confidential information [19]. In other words, school management information systems increase effectiveness and efficiency by saving time and facilitating the development of alternative solutions for sophisticated problems [20].

Here, INEISTM™ presents new concepts and continued improvements for the academic sectors. The purpose of INEISTM™ is to streamline and transform the Ministry of Education business processes to support its current needs to implement, monitor and measure the National Education Scheme (SPN 21) [21] (see Appendix A for iNEISTM details and descriptions). Basically, iNEISTM was designed to ease the administrative work of teachers. The system would allow teachers to focus on teaching and schools to update the details of teachers' workloads directly and properly; for attendance, curriculum, results and school fees, it is just a matter of one click, and the data are submitted to their destination automatically. The introduction of iNEISTM has evidently reduced the time needed to take attendance for teachers. This aspect was one of the methods adopted by the Ministry of Education to lessen the burden of teachers who must carry out extra administrative work in addition to teaching. More importantly, a ninety-five percent attendance rate across government primary and secondary schools has been recorded since the implementation of the online attendance monitoring system.

### 2.3 Effectiveness of Educational MIS

iNEISTM development is a government initiative as an E-Government implementation that uses ICT to offer citizens and businesses the opportunity to interact and conduct business with government by using different electronic and social media such as email, internet, Twitter, Instagram and Facebook [22]. From a technical standpoint, E-Government initiatives usually involve several types of electronic and information systems, including database, networking, discussion support, multimedia, automation, tracking and tracing and personal identification technologies [23] (see Appendix B for E-Government Brunei descriptions). The challenges of E-Government can be translated into the perspective of user's acceptance. User involvement research focuses on two outcome variables: system quality and system acceptance. Underlying these are the more complex issues of cognitive and motivational factors which give rise to improved quality or improved acceptance. Drawing on empirical evidence from qualitative studies [24], some have claimed that user participation is essential to the success of systems. User participation is advocated when acceptance is critical, or when information required to design the system can only be obtained from users. ICT adoption and diffusion has been studied in great detail by researchers in the information systems area. ICT acceptance in education remains a central concern of information systems research and practice. Although ICT is playing an increasingly important role in contemporary education, resistance to ICT remains significant in the education sector [25].

It is important to note that in addressing the effectiveness of educational management systems, the Technology Acceptance Model (TAM) has been widely applied and used for explaining ICT users' intentions. TAM was originally



introduced and studied as a means of understanding how users adopt and use new technology by evaluating the factors that influence the decision to accept a new technology. It is based on the belief “that perceived ease of use and usefulness can predict attitudes toward technology”. The perceived usefulness of a technology and ease of use of a technology combine to create an attitude about the technology, influencing the decision to adopt the technology shaped by external factors unique to the situation, while the behavioral decisions ultimately dictate whether and how a technology is used [26].

The theoretical grounding for TAM is the Theory of Reasoned Action (TRA). The TRA is based on the concept that beliefs influence attitudes, which lead to intentions, which generate the behavior of the systems and users. It specifies the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using and actual usage behavior [27]. The basic premise of this model is that the more accepting users are of new systems, the more they are willing to make changes in their practices and use their time and effort to actually start using the system [28]. The lack of user involvement is one reason for project failure [29]. When TAM is applied to explain the adoption of iNEISTM, this can be achieved through users’ adoption of usability and operability. It follows the tradition of the belief–attitude–intention–behavior relation. According to the logical connection argument, intentions cannot predict behavior as this is linked “analytically” where the causal relationships between these cannot be tested empirically and cannot be subjected to falsification. In view of this paper, instead of asking whether the TAM model is verifiable or falsifiable in relation to iNEISTM, the more important question to ask is whether the related studies are able to discover new knowledge, develop new exploratory techniques and predict possible outcomes [30].

#### **2.4 Big Data Technologies as Enablers of Digital Education**

Today, in this modernized world, data are generated everywhere: social networks, email, chatting, documents, photos, online purchases, online banking as well as online education. Most of these data are stored in the data warehouse, which is also referred to as a centralized database. The analysis and processing of these huge and complex data are beyond the capabilities of traditional methods. Big data are very important as they help in the analysis of decision-making processes within an organization. However, there are three stages to unlocking big data in any organization. Firstly, collection is the first step that should be taken to unlock the value of big data. This involves identifying data that can reveal valuable and useful information. Next is the analysis: once the data are proven to be useful, they should be analyzed in order to obtain actionable information that can be used. However, this is a very complex process, due to the growing diversity of data and the challenges of analyzing these diverse datasets—this is where the complexity of big data lies. Lastly, visualization and application is the last stage of data analysis, where data are made available to users which are understandable and interpretable for further processes such as decision-making [31].

The rise of big data, which is a knowledge system, is already changing the objectives of knowledge and social theory in many different fields while also having the potential to transform management decision-making theory [32]. There have been various attempts to utilize big data in education made around the world. For instance, in places like the USA, there are many schools that are making decisions by utilizing students’ individual education data to help them to improve their academic achievement. Big data can influence higher education practice through enhancing students’ experiences in order to improve the academic programming, to ensure more effective decision-making and strategic responses to changing global trends. Big data are first stored in the form of large databases and then undergo data processing. In big data processing, there are actually four requirements in total. The first requirement for big data



processing is fast data loading, and the second is fast query processing. The third requirement is highly efficient utilization of storage space, and the fourth is successful adaptation to highly dynamic workload patterns. After processing, the next step is big data analytics. Big data are important because they are able to provide information and knowledge of value, which enables one to make a better decision.

The most important technology in utilizing big data is the data mining technique. This technique is used to extract meaningful information from the vast amount of data in the field of education. This meaningful information can be very useful in providing individual learning experiences for the students given the fact that it can create customized learning methods to cater for individuals. For example, analyzing student logs using the mining technique can help lecturers to obtain valuable insights from the data analysis to help them understand the behavior of different students better, and with this, they can create customized education services that are suitable for every single student. It is also important to constantly keep track of the progress of each student as these real-time data can be analyzed further to enable future improvements [33].

Adaptive analytics help to assess a student's level and attention to a particular subject. For example, they will provide students with directed learning to enhance the results of the study by providing the necessary skills and information to help their understanding of a particular subject. On the other hand, social network analytics help to reflect the human relationship—for example, when a student interacts with the learning management system, emails and discussions take place, where information is exchanged regarding their subjects. Discourse analytics analyze contents, comments or thinking in the text of students, which is particularly useful to measure the quality of online education. Text mining is part of discourse analytics. For example, this might involve analyzing online text to determine the degree of interaction between students and measuring the lessons to see the progress of students. However, big data are starting to grow exponentially, especially in the field of education. Governments are beginning to see the potential of big data for education as they have seen what they can do in the area of education [34]. They can be utilized to help evaluate the performance of both schools and teachers, support competitiveness and also improve efficiency. In higher education, there has also been an increase in the usage of data mining and predictive analytics to predict student behavior and classify it, such as to determine those who are likely to drop out from school and how many students are unlikely to achieve passing grades [35].

### **2.5 Impacts Of Covid-19 Pandemic On Global Education:**

Lockdown and social distancing measures due to the COVID-19 pandemic have led to closures of schools, training institutions and higher education facilities in most countries. Education systems and educators have been forced to adopt “Emergency Education”, transitioning from traditional face-to-face learning pedagogies to remote virtual platforms, despite the challenges posed to both educators and the learners. This forced remote teaching and learning, viewed by Dhawan as paving the way for introducing digital learning, represents a paradigm shift in the way educators deliver quality education. Challenges inherent in sudden, reactive rather than anticipated and planned e-learning responses to a global pandemic, include accessibility, affordability, flexibility, learning pedagogy, life-long learning, and educational policy. While many countries have substantial issues with a reliable internet connection, others report an inability to afford online learning devices, sufficient physical workspace, or a lack of parental guidance (more so for younger learners) [36] identified that the best practices for online home schooling are yet to be explored, and that many students learning at home had undergone psychological and emotional distress and were unable to engage in online learning productively.



Another challenge identified by recent publications on the impacts of Covid-19 on teaching and learning globally, include providing comparable assessments and examination conditions to the pre-Covid-19 face-to-face provision. Research by Sintema reported that reduced contact hours for learners and a lack of consultation with teachers when facing difficulties in learning/ understanding, resulted in lowered performance on year-end examinations and internal assessment outcomes. Online student assessments were documented as requiring a lot of trial and error, with uncertainty and confusion occurring among the teachers, parents, and students. It was found that appropriate measures to check plagiarism was yet to be put in place in many schools and institutions, mainly due to the large student populations involved. The lockdown of schools and universities has not only affected internal assessments and examinations for the main public qualifications like General Certificate of Secondary Educations (GCSE), but A levels have also been cancelled for the entire cohort in the United Kingdom. The United Nations anticipated that a postponement or complete cancellation of the entire examination system was possible, depending on the duration of the Covid-19 lockdowns, globally. For example, due to the Covid-19 outbreak and national lockdown in India, various entrancelevel examinations [37]. Current literature indicates there are economic, social, and psychological repercussions on the life of students while they are away from their normal schedule of study. Increased and unstructured time spent on online learning platforms exposes children, adolescents, and young adults to potentially harmful and violent content as well as greater risk of cyberbullying. School closures and strict containment measures mean more families have been relying on technology and digital solutions to stay engaged in learning, be entertained, and remain connected to the outside world. Substantial increases of time spent on virtual platforms is reported to impact on domestic violence and child abuse as the perpetrators are often at home or in the neighborhood, which is a mental distraction and threat to the learners [38].

From a positive perspective, the COVID-19 pandemic has forced governments and educational policy makers, at all levels of education, to take immediate action to optimize implementing e-learning systems during the Covid-19 global pandemic. This urgency has forged a strong connection between educators and their communities, especially with parents who have, without any training, become educators in situ. The use of online platforms such as Google Classroom, Zoom, virtual learning environment and social media and various group forums are being explored and tried for teaching and learning, to continue education through digital platforms. The impacts of Covid-19 on HE teaching and learning in 2020 precipitated educators (locally and globally) to develop creative initiatives to overcome the limitations of virtual teaching. For example, lecturers needed to actively collaborate with one another at an institutional level to improve online teaching methods. There were and still are incomparable opportunities for cooperation, creative solutions, and a willingness to learn from others by trying new tools as educators, parents and students sharing similar experiences [39]. While online learning has provided the opportunity to teach and learn in innovative ways, many inequities have emerged from this forced shift to remote teaching and learning. As of July 2020, 98.6% of learners worldwide were affected by the pandemic, representing 1.725 billion children and youth, from pre-primary to higher education, in 200 countries. Therefore, making learning possible and available from home schooling has been the need of the hour at all levels of teaching and learning.

## **2.6 Current Research on the Impact of New Technologies on Learning:**

Integral to this research is an examination of the theoretical perspective upon which the article was based: a socio-ecological perspective. The implications of being a university lecturer whilst living through the overarching impacts of the Covid-19 lockdown were that “normal” face-to-face teaching and learning was speedily replaced with remote online teaching, and a new way of engaging with the university’s Information and Communication Technology (ICT)



systems. A body of empirical work now exists on the relationships between new technologies and teaching and learning (for recent edited volumes see OECD's Programme for International Student Assessment (PISA) surveys, 2000, 2003, 2006); Pew Research Centre, 2011; SMART Technologies International Society for Technology in Education (ISTE), n.d.). This body of knowledge is not new to pandemic times. Much of the existing work has recognised strengths; it frequently applies multidisciplinary perspectives, multiple methods, and a crossnational perspective which we would expect to take up in lockdown times [40]. Some studies draw attention to the role of the government, social norms, and future directions. There is considerable agreement on some issues: for example, the positive effects of digital devices to enhance and motivate learning for more able students, increased opportunity for self-directed and independent teacher and student learning, flexibility of learning 'times', and the need for effective teaching resource development and implementation. What is not so evident is a consideration of less able and/or less advantaged (culturally, socio-economically, politically) students. There is considerable agreement about the size and direction of effects: that both online learning to lifestyle (home bubble) and online learning to livelihood (employment) spill over exists, with either positive or negative impacts. However, positive online learning to lifestyle is more common and significant than negative online learning to livelihood interactions. Other considerations of note are the time frame within which new technologies are designed and implemented, the competency and confidence of the educator in utilizing new technologies, and the changing role of the educator in the learning process. Impacts on teacher well being are also highlighted by recent research [41].

Studies identify two forms of concern when implementing new technologies within a learning environment: 1) Information overload for educators and students due to the speed of access and volume of material available through digital platforms, such as the internet (via the world wide web), social media sites, and other forms of software programs and 2) Increased workload due to: 24-h connectivity, reduced capacity for educator strategic technology planning, appropriate integration of technology in teaching and learning, professional development and technology infrastructure management. Existing research shows the benefits of new technologies on learning are most pronounced when ICT facilitates the sharing of resources, expertise, and advice, when it provides greater flexibility for educators to carry out different kinds of task at different times, and promotes educators' skills, confidence and enthusiasm when navigating changes in teaching and learning techniques, for example from face-to-face to online learning[42]. The same research indicates that increased use of technology can severally affect the thinking ability of students, reduce the face-to-face interaction between educator and student that provides a more personal experience, and result in a lack of interest in learning as everything is accessible through data saved in a computer or on mobile devices.

We know which factors can make a difference to the successful transition from face-to-face to online learning, without detrimental impacts occurring for educator and student lifestyles and livelihoods. By using modern technological devices educators can expand their knowledge and develop their professional teaching skills. However, this in itself is a learning process which requires time, expertise, resources, and motivation. While the study of the impact of new technologies on learning has been undertaken in several countries in the past 10 years, a forced shift to online learning during exceptional circumstances such as natural disasters, pandemics, and other disruptive situations, has not previously been documented prior to the Covid-19 global pandemic. First, much of the existing research is based in first-world centric countries such as the United Kingdom, Canada, Australia, and the United States with relatively little research occurring outside these areas. During the 2020 Covid-19 global pandemic, over 100 countries [43] experienced 'lockdown' to reduce community transmission of the coronavirus. This article aims to provide insights from the professional selfobservation and self-reflective practice of two HE lecturers in New Zealand, to inform future

institution-based policy and procedures, locally and farther afield. Second, the existing body of work provides a balance between positive and negative impacts but within the context of a 'normal' teaching and learning context. The current global pandemic has forced many countries into rapid online learning, with educators and students being displaced from their usual place of 'work', working, or studying from home, learning new digital platforms and systems within short timeframes, while institutions and educators have endeavored to provide pastoral care for their learners, from a distance. This scenario is unprecedented. It was unexpected and had the potential to cause major disruption and disconnection for the teaching and learning process, world-wide.

Third, there is substantial research on the impact of new technologies on student learning and wellbeing within a classroom and student learning and wellbeing outside the classroom but less so on the relationship between new technologies, online learning, and wellbeing. A rapid shift to online learning is a new phenomenon which bears little resemblance to deliberately designed online teaching and learning [44]. The extraordinary situation of working or studying remotely from home (within a lifestyle bubble) requires multiple adaptations, reorganizations, and physical space. Access to electronic hardware and software (livelihood), and some semblance of 'normal' (wellbeing) are essential to provide reassurance and direction, for students and lecturers alike. The sense of disconnectedness from and loss of a 'regular' daily routine was sudden and disturbing, with mental ill-health negatively impacted for many. This article is positioned to address, through the collaborative autoethnographies of two lecturers, the intersection of the three domains of HE experiences, lifestyle, and livelihood (Figure 2) as portrayed by the self-reflective practice of Anna and Hana. These insights provide critical knowledge when reflecting on HE teaching and learning contexts.

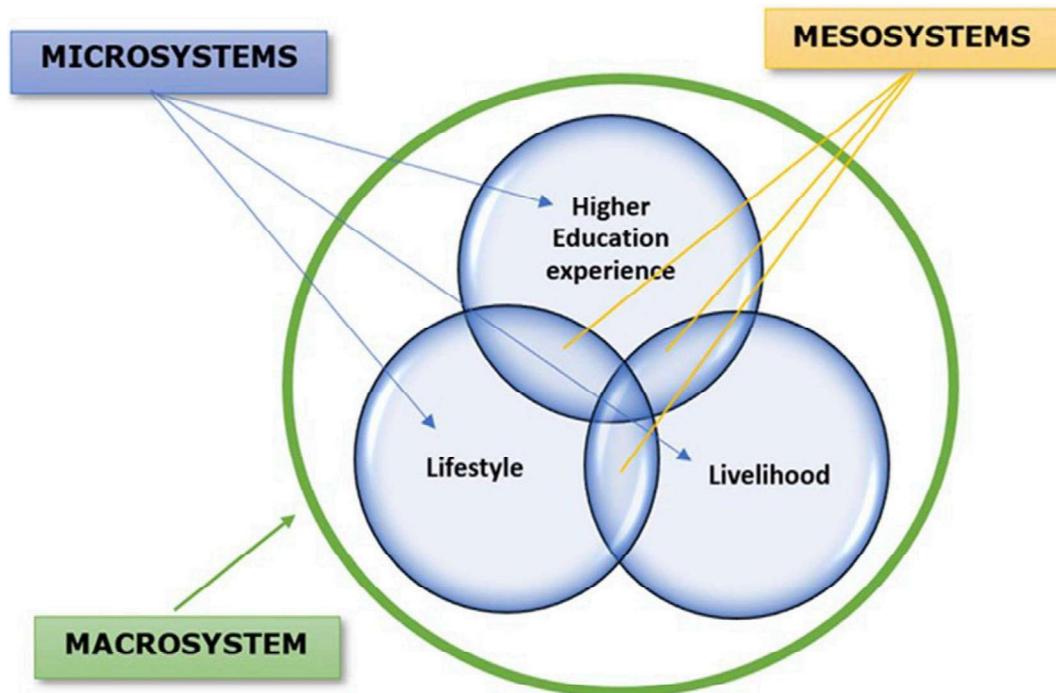


Fig. 2: An ecological systems model of higher education, livelihood and lifestyle experiences.

### 2.7 Conceptualizing Higher Education Experience, Lifestyle, and Livelihood:

Research about educators' experiences is usually undertaken to highlight best practice to support and develop educational outcomes. Consideration of the impacts of the educator's lifestyle (home) and livelihood (employment) on their experience as an educator, are scarce. Much existing research has been undertaken on teaching and learning with only brief reference to the spillover effect on an educator's lifestyle and livelihood. The microsystems in Voydanoff's adaption of Bronfenbrenner's Socio-Ecological Model (SEM) (Figure 1) represent influences of proximity to the central individual (educator): regarding their higher education experiences (on campus teaching, colleagues, managers, administrators, resources, assessment and reporting deadlines, reviews, planning, etc.), livelihood (physical workplace, tasks and conditions, hours per day, remuneration, outputs, career pathway), and lifestyle (family, extended family, friends, neighborhood, hobbies and interests, leisure, use of leave). It is the most influential level of ecological systems theory. Beyond this, a mesosystem of intersecting domains exists, surrounded by an exosystem: that is, the external environment which affects the individual but in which they do not personally participate, such as, top-down decision making, policies and procedures [45]. Finally, these are located within a larger "macrosystem" which comprises overarching cultures, institutions, and broad belief systems.

The mesosystem, consisting of different parts of the microsystem or interactions between different parts of a person's microsystems, has a direct impact on the individual which can be influenced either positively or negatively. The macrosystem involves the links between a social setting in which the individual does not have an active role and the individual's immediate context. For example, an individual being restricted to stay within their "home bubble" due to the Covid-19 lockdown, and not venturing out except for essential supplies or for the permitted 1 h of exercise per day. The larger macrosystem also encompasses an environment which includes the economy, culture, and politics, and describes the overall societal culture that an individual lives in. These overarching cultures, institutions, and broad belief systems, impact on the individual indirectly but may be experienced through policy changes, rules, procedures, or laws [45].

Further interpretation of [46] adaptation of SEM, suggests that each of the domains overlap, intersect, and can directly impact or affect the other domain/s (Figure 1). The model suggests that a complex ecosystem constructs an outcome for the central individual. For the HE lecturers in this article, the intersections (mesosystems) are of particular interest due to spill over between their higher education, livelihood, and lifestyle experiences. Analysis of each domain (microsystem), intersections between the domains (mesosystems), and the demands and resources within and beyond the overarching macrosystem, matter to outcomes. While the model is displayed in a tripartite form, the balance between domains, and intersections across domains, makes analysis of influences and impacts unique for every individual. Comments from Anna and Hana follow to illustrate their initial impressions regarding the Covid-19 lockdown.

### 3.1 Towards A Socio-Ecological Systems Model Of Higher Education Experience, Lifestyle, And Livelihood During The 2020 Covid-19 Lockdown

In Figure 3, the authors adjusted the SEC model for higher education, livelihood, and lifestyle experiences to incorporate additional factors impacting each domain: power, time, space, and life stage. According to Pocock et al. [45] research, how the aspects of the system act and interact together, constructs the well-being of those who live in any socio-ecological system, with economic productivity and social reproduction dependent on the effective functioning of all areas of the system. The additions to Figure 3 of power, time, space, and life stage illustrate how

multiple factors can influence and have potential to act and interact, to create opportunities, outcomes, and obstacles, or to create a new system equilibrium (transformation). The impact of demands and resources identified as acting in each domain and at each intersection, generates a further level of complexity to the analysis and interpretation of each lecturer's experiences during lockdown in 2020. A greater depth of interpretation and understanding was possible when conceptualizing the impacts of Covid-19 on teaching and learning, through Figure 3 model of socio-ecological systems (SEC) theory.

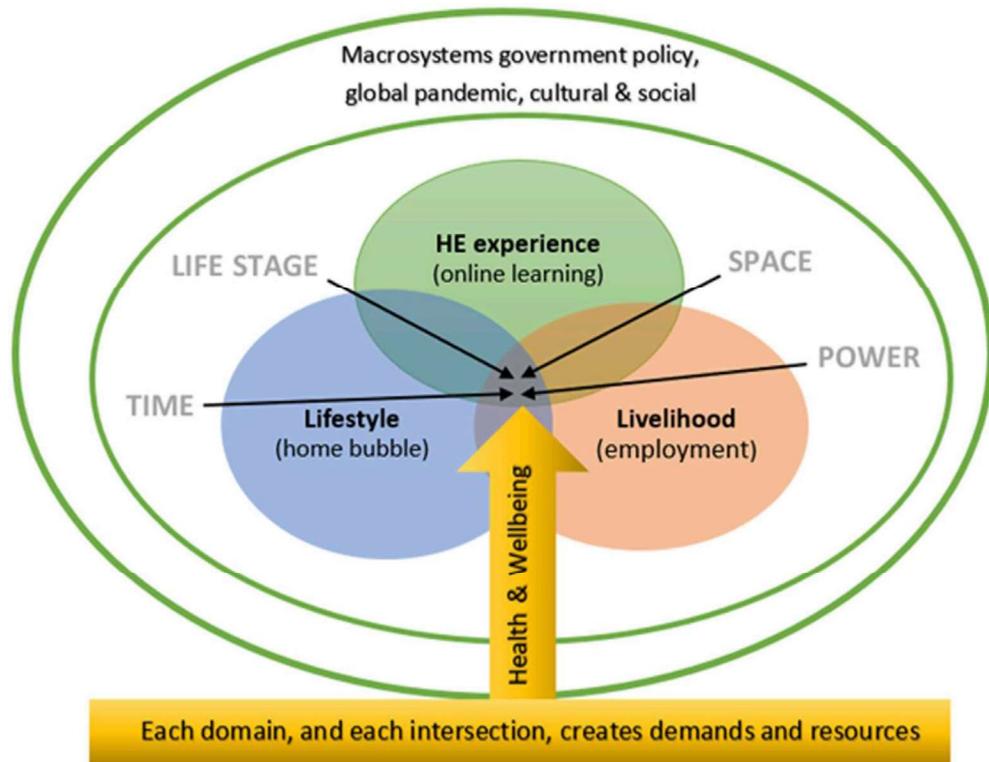


Fig. 3 A socio-ecological systems (SEC) model highlighting the multifaceted influences and interactions of Higher Education experiences, livelihood, and lifestyle on an individual's health and wellbeing during a global pandemic phenomenon.

The relocation of the workplace into each lecturer's home bubble, the increased demands on time due to a spill over between one microsystem and another (livelihood, lifestyle, and HE experience), sudden changes to personal spaces, and the impact on individual health and wellbeing are acknowledgment by the additions of power, time, space, and life stage. The underlying effects of demands and resources on each microsystem and on the whole ecosystem are recognized, combined with how these multiple influences impact on the individual's health and well being.

Several factors are consistently relevant at each level of the higher education experience, livelihood, and lifestyle domains (microsystems). Namely, the power dynamics of students, teachers, and management teams (power), the



timeframes within which information, restrictions, and resources were disseminated (time), the implications of students learning solely within their home bubble and teachers working fromhome (space), and the impact of these interconnected and interrelated factors on educators and students (life stage). Each of these key aspects is discussed further: Power: Relative to the dynamic between lecturers and their students (microsystems), lecturers and their colleagues (mesosystems), middle management with associated lecturers and administrators (exosystem), middle management with higher management structures (exosystem), and higher management structures with external governance and other macrosystem influences [47].

#### 4.1 Conclusion

The shock of the COVID-19 crisis on education has been unprecedented. It has set the clock back on the attainment of international education goals, and disproportionately affected the poorer and most vulnerable. And yet, the education community has proved resilient, laying a groundwork for the rebound. There remains a risk of a downward spiral, in a negative feedback loop of learning loss and exclusion. Yet every negative spiral of aggravating socio-economic circumstances suggests its reverse image of a positive spiral, one which would lead to the future of education. Ensuring learning continuity during the time of school closures became a priority for governments the world over, many of which turned to ICT, requiring teachers to move to online delivery of lessons. Sustainable solutions should build upon experiences with the widespread use of technology to ensure learning continuity during the pandemic, including for the most marginalized. The schools and teachers should no longer be seen as “knowledge delivery systems” and that teachers should be empowered to take greater ownership of what they teach and how they teach it. There has to be number of alternative solutions for sustaining the quality of education and keeping our students going on in good spirits.

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