Changing learning paradigms: an interplay of Digital Taylorism and technostress on perceived employability

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Abstract

Purpose – Massive open online courses (MOOCs), a Taylorist attempt to automate instruction, help make course delivery more efficient, economical and better. As an implementation of Digital Taylorism Implementation (DTI), MOOCs enable individuals to obtain an occupation-oriented education, equipping them with knowledge and skills needed to stay employable. However, learning through online platforms can induce tremendous amounts of technology-related stress in learners such as complexity of platforms and fears of redundancy. Thus, the aim of this paper is to study how student perceptions of DTI and technostress (TS) influence their perceived employability (PE). The role of TS as a mediator between DTI and PE has also been studied.

Design/methodology/approach – Stratified sampling technique has been used to obtain data from 305 students from 6 universities. The effect of DTI and TS on PE, and the role of TS as a mediator, has been examined using the partial least squares (PLS) structural equation modelling approach with SMART PLS 4.0. software. Predictive relevance of the model has been studied using PLSPredict.

Findings – Results indicate that TS completely mediates the relationship between DTI and PE. The model has medium predictive relevance.

Practical implications – Learning outcomes from Digitally Taylored programs can be improved with certain reforms that bring the human touch to online learning.

Originality/value – This study extends Taylorism literature by linking DTI to PE of students via technostress as a mediator.

Keywords Digital Taylorism, Perceived employability, Technostress, MOOCs, Human–machine interactions

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1. Introduction

Taylor's philosophy of human–machine interactions, characterized by incorporation of human skills into machinery, has been an enduring one (Blake and Moseley, 2010; Pruijt, 2000). His book, *The Principles of Scientific Management* (Taylor, 1911), a "foundational text" for organization theorists, has been categorized as "the most influential book on management ever published" (Kemp, 2013, p. 345). The historical contribution of his work to numerous fields has earned him the title of Father of Scientific Management (Copley, 1923; Payne *et al.*, 2006). This is majorly because application of Taylorist principles improves efficiency, controllability, predictability and numerical flexibility for an organization (Altass and Wiebe, 2017). Despite vast criticism (Morgan, 1997; Simon, 2009), Taylorian elements, conceived in the modern era have even graduated into the postmodernist paradigm (Kemp, 2013). Principles of scientific management can still be found in contemporary enterprises and are likely to continue, spreading out far beyond factory floors (Liu, 2022; Peaucelle, 2000). In fact, these principles have been deconstructed, revealing their perpetuation in post-modernist concepts such as total quality management, empowerment and teamwork (Kemp, 2013). The philosophy of Taylorism has already permeated to industries associated with knowledge like information technology (IT), legal, pharmaceuticals and financial services (Brown *et al.*, 2011). Now, with hyper-dynamic technological progress taking place, mechanical Taylorism that dominated the 20th century has evolved into Digital Taylorism that is likely to accent the 21st century (Günsel and Yamen, 2020). In this paper, we aim to study the perceptions regarding implementation of Digital Taylorism in an educational context, and its impact on cognitive states (technostress) and student outcomes (perceived employability).

As work contexts change, scholars and practitioners iterate that the education policy ought to acknowledge, account for and respond to changes (Altass and Wiebe, 2017). The automation of higher education under the new technocratic imperative has become a possibility with disruptive e-learning technologies such as massive open online courses (MOOCs) (Al-Imarah and Shields, 2019). The potential of this technological convergence can be leveraged to achieve a global convergence of higher learning (National Science Foundation, 2002). Mirrlees and Alvi (2020) characterize MOOCs as an excellent implementation of Digital Taylorism based on their epitomizing of the most basic Taylorian elements – efficiency arising from automation of instruction, cost-effectiveness due to reduced expense of instruction and evaluation, and establishment of "one best way" of teaching a course. At a time when higher education institutions (HEIs) are increasingly being held responsible for preparing employable graduates equipped to deal with the market demands of continuous reskilling and learning, *Digitally Taylored* MOOCs offer many benefits.

Primarily, acquiring a quality education is the only way to deal with technological developments in the economic landscape (Brynjolfsson *et al.*, 2014). However, it is a mighty endeavour for HEIs to prepare students for jobs that do not exist yet (Weise, 2020). Yet, this is necessary as we observe a dramatic shift towards notions of lifetime employability in lieu of lifetime employment (Fugate *et al.*, 2021). Keeping in mind the importance of adaptability in the changing technological landscape, an emphasis on employability, then, is incumbent (Tymon, 2013). The concept of employability stresses on an individual's ability not just to find employment but also to maintain that employment over the course of their working lives (Hillage and Pollard, 1998; Vanhercke *et al.*, 2014).

Scholarship in the area of employability places educational level as an important determinant of PE. However, the polarization, automation and flexibilization of labour markets forces us to explore newer approaches to studying employability and its determinants (Martínez-Cerdá *et al.*, 2020; Khatri *et al.*, 2023). In this regard, MOOCs, as a Digital Taylorism Implementation, enable individuals to obtain a quality education depending on their needs.

This is crucial for building confidence in one's employability. Employability researchers have established that those who hold positive perceptions in relation to the future of their jobs, tend to demonstrate better employability, underscoring the importance of perceived employability (Berntson and Marklund, 2007; Martínez-Cerdá *et al.*, 2020). *Vis-à-vis* students, Rothwell *et al.* (2008) define perceived employability as the "the perceived ability to attain sustainable employment appropriate to one's qualification level." Additionally, online educational platforms house a vast variety of niche courses that can aid employability enhancement (Martínez-Argüelles *et al.*, 2022) and help students develop higher levels of PE.

Now, while technology brings opportunities for lifelong learning and employability, it also presents some challenges. Learning through online platforms demands a certain level of digital competence to adapt to the technological environment, and consequently manage negative emotions such as, technology-related stress (Liapis *et al.*, 2022). Technostress, an incapability to cope up with new technology, can create psychological pressures that are known to lead to poor student outcomes (Upadhyaya and Vrinda, 2021). The Person–Environment fit theory conceptualises stress as a result of mismatch between the individual and the environment (Edwards *et al.*, 1998). Students give immense importance to learning contexts for realizing their career aspirations. The belief that they are unable to cope with technology enhanced learning, can create an unbalanced relationship between the student and their learning environment (Schettino *et al.*, 2022), leading to lower levels of employability perceptions. This paper, thus, addresses three major research questions:

RQ1. Do students perceive themselves as more employable after completing a Digitally Taylorized implementation of online courses (such as MOOCs)?

RQ2. Do students experience more technostress because of such Digitally Taylorized implementations in an online learning environment?

RQ3. How do perceptions of Digitally Taylorized implementations in online learning environments influence technostress, and consequently perceived employability in a changing technological landscape?

Thus, in this study, we aim to study the interrelationships between student perceptions of Digital Taylorism Implementation (DTI), Technostress (TS) and Perceived Employability (PE). The originality of our study lies in its ability to address the following gaps in extant research. One, much of the research on Taylorism is of a conceptual nature. Ours will be amongst the few studies that take an empirical approach to studying the relevance of Taylorism. Two, majority of Taylorism studies are limited to the manufacturing sector, with a serious dearth of literature relating to education sector. Three, research on Digital Taylorism in particular is very sparse. Few studies have attempted to define the concept, and even fewer that have studied its applications and implementations. This paper responds to calls from Maclean *et al.* (2017, p. 5) proposing "that business history should come in from the cold to play a more central role in business and management research." Consequently, this study draws on management history, to inform applications in the contemporary business environment.

The paper contributes to management theory and practice in the following four ways. One, by studying DTI in an educational context, we have expanded the applicative potential of Taylorism to digital education in a post-industrial era. This has also allowed us to explore further the student-outcomes of global convergence of learning. This stands as an immense contribution to the body of knowledge. Two, this study is novel in its endeavour to study the influence of the dimensions of DTI and TS in relation to PE. We put forth a framework where technostress completely mediates the relationship between the two, constituting our second major contribution to theory. Three, the study contributes to practice by providing practical

insights on implementing Taylorized MOOCs that can support effective learning. Finally, the paper stands to spark interdisciplinary discussions concerning Digital Taylorism applications in contemporary society.

2. Literature review

2.1 Theoretical underpinnings

The study finds its theoretical base in three theories Stimulus–Organism–Response (SOR) Theory (Mehrabian and Russell, 1974), Human Capital Theory (HCT) (Schultz, 1961) and Person–Environment (PE) fit (Edwards *et al.*, 1998).

Primarily, we build on the SOR theory, which allows for an orderly evaluation of behavioural intentions keeping in consideration environmental stimulation and internal psychological states of humans. The theory encompasses three aspects:

(1) stimulus, comprising external environmental cues that can affect changes in an individual's internal state and ultimately, behavior;

(2) organism, where internally activated stimuli are processed giving rise to an individual's inner state such as feelings, emotions and thinking; and

(3) response, which constitutes an individual's reaction to input stimulus in the form of psychological attitudes or behavioral reactions (Jacoby, 2002; Kim and Park, 2019; Peng *et al.*, 2021; Zhai *et al.*, 2020; Jain *et al.*, 2022).

The SOR model has frequently been applied to study individuals' cognitive responses, and how they follow from stimulation in an online environment (Khan *et al.*, 2017). Apropos of an online environment, the theory posits that the impact of external cues on user response pattern, can be mediated through computer-generated experiences (Cao *et al.*, 2019). The stimuli can activate students' involvement with the learning environment (Khan *et al.*, 2017). Consequentially, Digitally Taylored online learning environments acts as an input environmental stimulus that can influence a student's cognitive, emotional and mental states (Loh *et al.*, 2022). Such technology enhanced learning opportunities demand more time, effort and skills on part of students (Wang *et al.*, 2020a). For example, with increased industry focus on MOOCs, students find themselves under pressure to undertake higher levels of self-learning, while managing time and expending additional effort to become job ready. Thus, such platforms of learning (stimulus) can become a source of psychological strain for students (organism), manifesting as technostress, and impact their self-perceptions concerning employability (response).

Further, according to HCT, "deliberate investments" in education, training and competency development of humans lead to coveted results. At a micro level, such investments are rewarded with improved economic and labour market outcomes, such as better jobs, higher income and greater quality of life (Li and Wang, 2020; Rosendale, 2017). The human capital model also supports the notions of skill-biased technological change whereby, highly skilled workers command significantly higher returns in a technology-intensive labour market (Goglio and Bertolini, 2021) It is now a well-accepted fact that continued success in the labour market requires constant re-skilling and upskilling. Digitally Taylored online environments are able to provide a large number of occupational-oriented courses at low costs. MOOCs, especially aimed at developing human capital (Park *et al.*, 2021), can help individuals accumulate vast variety of employability skills. Moreover, they provide an individual with marketable skills, significant during job search and performance. They allow individuals to acquire knowledge and competencies, improving their self-confidence and strengthening their self-perception in the process (Rosendale, 2017; Sablina *et al.*, 2018). Having a higher base of knowledge and skills, or human capital, should thereby increase self-perception of employability (Drange *et al.*, 2018).

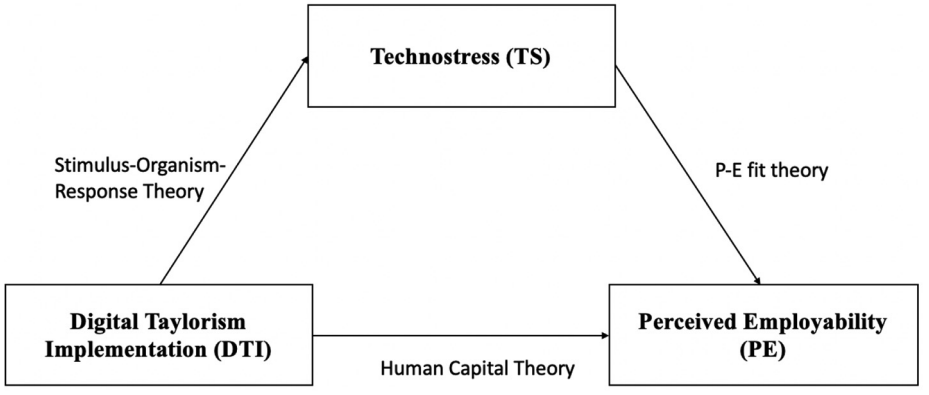
Drawing on this, we propose that Digitally Taylored online learning environments can influence PE of students.

The P-E fit theory also contributes in explicating the relationship between TS and PE. The theory is based on the fundamental premise that stress is a function of an imbalanced relationship between the person and the environment. Learning environment plays an important role in determining academic achievement and developing career competencies (Vermeulen and Schmidt, 2008). If students perceive themselves as being unable to handle the complexities and accompanying technology-enhanced learning, a misfit between the student and learning context emerges. The arising technostress can lead to lower levels of PE (Schettino *et al.*, 2022). Thus, based on these theoretical underpinnings, we propose a conceptual framework wherein perceptions of DTI influence TS and PE as depicted in Figure 1.

2.2 Literature review for hypotheses development

Scientific Management or Taylorism, the legacy of F.W. Taylor, has garnered as much acclaim as criticism over the years (Wagner-Tsukamoto, 2007, 2008). On one hand are those who scorn him for discounting the human elements while taking a mechanistic view of organizations; while on the other, those who find his ideas more conducive to humane aspects of organized labour than even Mayo's human relations approach (Lauer Schachter, 2016). Taylorism can be understood as a refinement of management strategy focused on logistical streamlining, standardization of tasks, formalization of operating procedures and a detailed division of labour. Far ahead of his contemporaries, Taylor sowed the seeds of systems thinking in management processes, promising "one best way" to do a job (Grachev and Rakitsky, 2013). Taylor's idea of separating conception from execution became the basis of effective work and administration in the twentieth century (Pruijt, 2000). Even today, Taylorist management principles continue to be relevant, with many Taylorian elements present in companies all over (Liu, 2022; Peaucelle, 2000). The principles of scientific management are being reinvented to address the evolving requirements of this century. In fact, the roots of Taylorism have transcended beyond the manufacturing floor to the digital age (Günsel and Yamen, 2020). The twenty first century, thus, is the era of Digital Taylorism (Brown *et al.*, 2011; Günsel and Yamen, 2020).

Brown *et al.* (2011) define it as the process of capturing, codifying and digitizing workers' professional and technical knowledge to software packages. Once business processes are



Source: Figure by author

Figure 1. Perceptions of DTI influence TS and PE

digitally coded, and tasks are computerized using artificial intelligence (AI), information is no longer limited to human minds, but accessible across digital databases and systems (Holford, 2019). This datafication of employee activities, allows management to improve labour processes, exercise control and intensify production (Delfanti and Frey, 2021). The industrialization of knowledge work is being discerned in professions such as medicine, consultancy, retail and finance, wherein tasks are increasingly being taken care of by software. Taylorist principles have also made their way into the field of education (Stoller, 2015).

To achieve efficiency in the teaching process, educational reforms have revolved around standardizing curriculums, establishing best practices and applying performance metrics (Mirrlees and Alvi, 2020). Now, as higher education zips towards automation under what may be described as the new "technocratic imperative", we see the emergence of online learning platforms to further improve the efficiency of instruction (Cavus and Zabadi, 2014). Online learning, or e-learning offers the benefit of targeted course offerings, location flexibility, time flexibility, immediate feedback and personalised learning to name a few (Moosa and Bekker, 2022). MOOCs, a flagship of e-learning, and have become an important ingredient of discourse in tertiary education (Liapis *et al.*, 2022; Oh *et al.*, 2020). In fact, Mirrlees and Alvi (2020) identify MOOCs as the latest in a long list of Taylorist attempts to automate instruction, making course delivery more efficient. This argument has a tripartite basis.

First, MOOCs help standardise the process of teaching. While MOOCs can have many different formats, most of them have certain common defining features such as video lectures, formative quizzes, automated assessments and online forums for discussions and support (Daradoumis *et al.*, 2013). Thus, MOOCs enable instructors to establish the "one best way" for teaching a course, standardize it by the way of reproducible video lectures and continuous assessments, and then impose this standard upon all enrolled students. Implementation of digital technologies that further the practice of standardization, and allow for increased control constitute a form of Digital Taylorism (Altass and Wiebe, 2017).

Second, MOOCs, being *Massive* Open Online Courses, allow thousands of participants to enrol in a course, enabling learning on a large scale (Lim, 2014). Thus, MOOC platforms such as Coursera, EdX, Udacity, Swayam, LinkedIn Learning are able to reach economies of scale, offering courses in large volumes, at low costs (Selwyn *et al.*, 2015). These outcomes are akin to those achieved by a Taylorian enterprise.

Finally, MOOCs bring efficiency to teaching – a highly subjective activity. They automate course delivery by provide a mechanized teaching model that allows for high quality content delivery, computerized assessments and evaluation and automated transactions between learners and the platforms (Mirrlees and Alvi, 2020). MOOCs may bring automation of the course delivery process, and effectively deskill professors by transferring their paramount skill of lecture creation and delivery to the MOOC platform. Thus, based on these three reasons, we argue that MOOCs can be conceptualised as an Implementation of Digital Taylorism in the context of online learning.

The increasingly uncertain labour market prospects, technological progress, accelerating knowledge economy, high performance workplaces and forever changing industry specific demands necessitate that focused attention be paid to the employability of individuals over the course of their careers and accompanying job transitions (Heymann *et al.*, 2022; Tymon, 2013). Moreover, escalating competition entails that employers make hiring decisions based on limited information about the candidate. To gain employment, how confidently candidates signal their professional value to prospective employers becomes a matter of great import (Gorbatov, 2020). Thus, one's perception of their possibilities of getting and

sustaining employment, i.e. PE, is an indispensable personal resource that enables an easy adaption to the volatile and largely unpredictable labour market (Berntson and Marklund, 2007; Cuyper *et al.*, 2008; Vanhercke *et al.*, 2014). The Bologna Process reforms place employability within the context of a lifelong learning paradigm that emphasises the importance of continuous learning throughout the course of one's life and career (Silva *et al.*, 2013). At a time when students are preparing for jobs that are consistently evolving or do not even exist yet, continuous reskilling has become imperative for employability (Brynjolfsson *et al.*, 2014). Online learning models such as MOOCs, in this regard, provide the perfect educational fix when incompatibilities between skill-sets and full-time work demands arise (Mirrlees and Alvi, 2020). MOOCs can help serve certain niches, improving accessibility of education for students with physical, mental or socio-economic constraints (Martínez-Argüelles *et al.*, 2022). Even after obtaining a university education, online learning can be crucial for developing relevant employability skills and competencies (Martínez-Cerdá *et al.*, 2018; Martínez-Cerdá and Torrent-Sellens, 2017). In fact, many MOOC learners already have a university degree, and yet take these courses in the expectation of professional benefits and career success (Oh *et al.*, 2020). People who complete these MOOCs often report substantial career benefits (Zhenghao *et al.*, 2015). According to Gorbatov *et al.* (2020), MOOCs can influence how students signal their professional value, or employability. In addition to imparting skills, such courses also give confidence to students to market themselves to prospective employers. Thus, we propose that MOOC learners will be able to enhance their PE by taking industry-relevant courses:

H1. There exists a positive relationship between a student's perception of implementation of digitally taylored online learning environment (DTI) and perceived employability (PE).

Further, accelerating digitization and globalization of society, especially post COVID-19, have pushed the education sector to subsume new online pedagogical structures that can complement labour market requirements (Martínez-Argüelles *et al.*, 2022). The development of these online structures is also in line with sustainable development goals that advocate for equitable, inclusive, quality education that simultaneously promote lifelong learning. Consequently, agents of e-learning, such as MOOCs, have become an almost necessary demand of the labour market, and even been integrated into traditional classrooms. Online learning through MOOCs offers benefits such as efficient delivery and cost effectiveness. However, it also poses challenges for students who have to adapt to new learning methods (Huang and Zhang, 2022). More often than not, it is assumed that the new generation of workers, on account of being "digital natives", are comfortable amid changing technological paradigms (Kee *et al.*, 2023). It is important to acknowledge that any form of technology-enhanced learning, be it MOOCs, or Learning Management Systems or even digital exam devices, can create a psychological pressure for students (Schettino *et al.*, 2022; Upadhyaya and Vrinda, 2021). Students have to spend more time, gain more skills and knowledge to adapt to this new method of learning, which can be a source of stress. Moreover, technical issues such as crashing of devices, virtual learning assignments, information overload, increased workload, unavailability of a practical pedagogy and lack of interaction with peers and instructors can become a source of stress for students (Kumpikaitė-Valiūnienė *et al.*, 2021; Slack and Priestley, 2022). Extensive online activities such as registrations, group activities and tests may also be a cause of stress to students (Zhao *et al.*, 2022b). Prior studies have indicated that prolonged use of information technology may bring technostress to students (Tarafdar *et al.*, 2007). Brod (1984, p. 16) defined the term as "a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner". This definition was expanded by Weil and Rosen (1997) to *incorporate* "any

negative impact on attitudes, thoughts, behaviors or psychology" that can be instigated by technology, either directly or indirectly. The technostress experienced by an individual can be understood from the perspective of person–technology fit model as well, which states that a lack of fit between technological characteristics and the individual can result in strain (Ayyagari *et al.*, 2011). Additionally, advancements in the business world necessitate that students must continually update their knowledge and skills. This can leave students with no free time at hand, even on holidays. Furthermore, an online environment is accompanied with uncertainties like instable network, constant software upgrades, changes in user interface, app/software failures that can further cause technostress in students depending on MOOC platforms. A failure to adapt to these online platforms can be a source of technostress (Kumpikaitė-Valiūnienė *et al.*, 2021). From here follows our second hypothesis:

H2. There exists a positive relationship between a student's perception of implementation of Digitally Taylored online learning environments (DTI) and technostress (TS).

Within the realm of psychology, it is a well-accepted notion that individual's behaviour often follows their perception of reality, i.e. subjective rather than objective reality (Katz and Kahn, 1978). We delineate PE as an individual's subjective perception of their prospects in the labour market (Vanhercke *et al.*, 2014). From an educational standpoint, this perception is largely dependent on how well-equipped students feel to enter the job market, and how they perceive the context characteristics. Environmental context is crucial to explaining micro-level, psycho-social outcomes. This perspective is underscored by the P-E fit theory (Edwards *et al.*, 1998). as well, which posits the need for equilibrium between an individual and their environment for fit. When there is balance between the two, positive outcomes result, while a maladjustment yields negative outcomes such as stress (Penado Abilleira *et al.*, 2020). Thus, graduates' academic achievement and competency profiles are contingent on the associated learning environment (Vermeulen and Schmidt, 2008). An important element of consequence here is the level of comfort a student enjoys with technology, or lack thereof.

For any e-learning platform, usability and user experience are key aspects (Liapis *et al.*, 2022). When interacting with MOOCs, users may often experience a variety of positive and/or negative emotions, trying to familiarize themselves with the platform. Emotions experienced by a user while interacting with MOOCs are important since they can impact learning. If students feel ill-equipped to traverse a technologically enhanced learning environment, a misfit between the student and learning context emerges, manifesting as technostress. The arising technostress can lead to lower levels of PE (Schettino *et al.*, 2022). This is because stress plays an important role in determining competitive outcomes, with high levels of stress being linked to development of underconfident individuals (Goette *et al.*, 2015). As self-confidence is a responsible for shaping employability perceptions in an individual, highly stressed students may have low PE (Álvarez-González *et al.*, 2017). Van Vuuren *et al.* (2020) found a relationship between technostress and employability. Schettino *et al.* (2022) identified technostress related to technology enhanced learning during the pandemic as a risk factor for PE in psychology students. Based on these findings, we hypothesise as follows:

H3. There exists an inverse relationship between technostress (TS) experienced by a student and their (PE).

Employability perceptions depend on various individual and contextual factors (Qenani *et al.*, 2014). For a student, how they perceive their own employability, depends a greatly on

how they perceive their learning context (Pitan and Muller, 2019; Trullas *et al.*, 2018). A positive perception of context is likely to lead to increased levels of PE. However, in a Digitally Taylored environment, the learning context is significantly altered compared to traditional learning environments. Such vast degree of changes invoke feelings of loss of control, bring uncertainty and make individuals question their abilities (Zhao *et al.*, 2022b). A major reason behind this could be the lack of comfort with e-learning environment (Thomas, 2022). Most learning theories iterate the central tenet that for learning to be effective, students must be able to interact with instructors, peers and course content (Bransford *et al.*, 1999; Mayer, 2003). These interactions can become difficult in an e-learning environment because they are mediated through information technology (Johnson *et al.*, 2008). Thus, student outcomes such as PE can suffer in light of technology-enhanced learning. Schettino *et al.* (2022) identify technostress as a risk factor that negatively impacts PE while adoption of online learning environments. A student's PE in an online learning environment, thus, is a result of interaction between how individuals perceive the learning context and internal states, such as technostress, experienced in consequence. Any negative feelings regarding the ability to cope with technologically enhanced learning environment, are likely to play a key determining role in the relationship between DTI and PE. Based on this, we propose the following hypothesis:

H4. Technostress (TS) mediates the relationship between students' perception of implementation of Digitally Taylored online learning environment (DTI) and PE.

3. Methodology

3.1 Sample and data collection procedure

This study draws on students who have taken MOOCs on any online platform such as edX, Coursera, Swayam, LinkedIn Learning to understand the relationship between students' perception of DTI, TS and PE. MOOCs are proving to be an educational game-changer across the globe (Marginson, 2017), garnering increasing popularity (Kaplan and Haenlein, 2016). However, despite them borrowing heavily from Taylorist principles (Mirrlees and Alvi, 2020), barely any studies have taken a Digital Taylorism lens to study them. Thus, an educational setting has been used keeping in mind the dearth of studies focusing on the impact of Digitally Taylored courses on student outcomes.

Multi-stage sampling was used to collect data from a representative sample. In Stage 1, stratified sampling technique was adopted wherein a list of public, private, deemed universities was obtained from the university grants commission (UGC) website. From this list universities were shortlisted based on the following selection criteria: should be based in Delhi-CNCR region; should be running professional courses (Engineering and Masters of Business Administration) keeping in mind the relevance of MOOCs for technical and professional courses among learners (Mohapatra and Mohanty, 2017); should include MOOCs as part of the curriculum. This returned a total of six universities (one public, four private, one deemed). In Stage 2, we adopted purposive sampling for reaching the sample of this study. We studied Engineering and Business students at two levels – first year and final year. These two years can be seen as the major transition years in a student's university life. In the first year, students are making a school-to-university transition and are often caught unprepared for the demands of higher education (Mokgele and Rothmann, 2014). In the final year, students are making a university-to-work transition and career related stress is prominent here. Studying both first and final year will also help bring out the role played by perceived institutional support in the course of one's education.

The study was duly approved by departmental academic integrity panel of the researchers' host institution for the purpose of ethical consent to conduct the survey on engineering and management students. Students of these universities were approached personally as well as through google forms. A mandatory disclosure was made regarding ensuring confidentiality and use of data restricted to academic purposes only. Due permissions were sought from respective institutions and respondents before administering the survey. The final sample of our study comprised 305 students from professional and technical courses in public, private and deemed universities.

3.2 Measures

Owing to the novelty of the constructs under study, and a lack of available operationalizations we have used self-constructed measures for all three constructs. The nature of the research in the area of Digital Taylorism is largely conceptual, with no available measures that can be applicable to the field of technology-enhanced learning. For technostress, the few scales that exist are not relevant to e-learning (Wang *et al.*, 2020b). Recent reviews in the area have highlighted the need for developing context-specific measures of technostress that give weight to social aspects (Borle *et al.*, 2021). Finally, existing measures of students' PE either do not incorporate contemporary elements of the changing technological landscape (Rothwell *et al.*, 2008) or are too lengthy for use in the present study (Bennett and Ananthram, 2021). The need for developing new measures relevant to student context have been cited by recent authors (Álvarez-González *et al.*, 2017; Qenani *et al.*, 2014) and thus this self-constructed measure.

The responses have been measured using a seven-point Likert scale with values ranging from 1 (strongly disagree) to 7 (strongly agree). The details of the scales used can be found in Table 1. The complete questionnaire has been given in Appendix.

3.3 Methods

The conceptual model in this study has been estimated using partial least squares structural equation modelling (PLS-SEM) method (Hair *et al.*, 2019a). PLS-SEM has been deemed suitable for our purpose, as it is a causal-predictive approach aimed at prediction when assessing statistical models delineated to furnish causal explanations (Hair *et al.*, 2019b; Sarstedt *et al.*, 2020). PLS predict has been used to ascertain the predictive relevance of our model. SmartPLS4.0 (Ringle *et al.*, 2022) has been used to examine the hypothesised relationships.

4. Results

PLS-SEM results have been evaluated and interpreted in accordance with the broad guidelines given by Hair *et al.* (2017). An SEM model comprises two components – an outer model (measurement model) and an inner model (structural model). In line with the thumb rules given, we have first assessed the measurement model, followed by the structural model.

4.1 Measurement model assessment

Unidirectional predictive relationships that exist between a latent construct and its corresponding indicator(s) are described using the measurement model (Hair *et al.*, 2011). The measurement model has been confirmed using four steps (Hair *et al.*, 2019b).

4.1.1 Indicator reliability. First, individual indicator reliability was established with the help of factor loadings. The recommended cut-off value of 0.708, as loadings above this

Construct	Dimensions	No. of items	Sample item	Cronbach's alpha
Digital Taylorism Implementation				0.889
	Formalization of procedures (FP)	5	"There are well-defined guidelines to access course content"	0.869
	Datafication of Course (DC)	*5*	"The course had relevant levels for understanding at the basic, intermediate and professional categories"	0.798
	Automated Evaluation (AE)	*4*	"There is a scheme for continuous evaluation throughout the course"	*0.84*
	Algorithmic Time Management (ATM)	*3*	"I get automated reminders for submission of my due assignments"	0.778
Technostress				
	Fear of Missing Out (FOMO)	*5*	"I'm constantly under pressure to apply for courses on online platforms to keep up with my peers"	*0.87*
	Complexity (CO)	*4*	"I feel I am unable to adapt to the online learning environment"	*0.829*
Perceived Employability		26		
	Contemporary Career Compatibility (CCC)	*7*	"I regularly participate in online courses to reach my career goals"	*0.892*
	Platform Reputation (PR)	*8*	"The reputation of online learning platform from which I have completed my course(s) will be instrumental in getting my dream job"	*0.91*
	Self-confidence (SC)	*8*	"I am confident of my domain knowledge developed through my online courses"	*0.923*
	Career Directedness (CD)	*3*	"I keep updating my career-related knowledge and skills (through online learning platforms)"	*0.83*

Source: Table by authors

Table 1.
Measures used

signify a construct's ability to explain an indicator's variance by more than 50% (Sarstedt *et al.*, 2020). Findings reveal that all indicator loadings exceed this threshold value, determining acceptable item reliability.

4.1.2 Internal consistency reliability. Second, internal consistency reliability was assessed with the help of composite reliability (CR) and Cronbach's alpha (α) measures, higher values

of which indicate greater reliability (Diamantopoulos *et al.*, 2012). As CR is considered a more reliable measure of reliability, we have given it preference in this study (Henseler *et al.*, 2009; Talwar *et al.*, 2020). CR values have been found greater than the suggested threshold of 0.7 and less than 0.95 signifying good reliability, while avoiding the problems of item redundancy (Diamantopoulos *et al.*, 2012; Hair *et al.*, 2014, 2017; Nunnally and Bernstein, 1994). These findings have been summarized in Table 2.

4.1.3 Convergent validity. Third, convergent validity has been determined with the help of the metric, average variance extracted (AVE). An AVE value of 0.5 or more is indicative of a construct's ability to explain at least 50% variance of its items (Bagozzi and Yi, 1988; Henseler *et al.*, 2009). We found PE and TS to yield acceptable AVE values, while the value for DTI was less than 0.5. In this regard, we cite the Fornell and Larcker (1981) criterion, which states that a construct's convergent validity can be considered acceptable provided CR > 0.6 even if its AVE < 0.5.

4.1.4 Discriminant validity. Finally, discriminant validity of our model has been established using Heterotrait–Monotrait (HTMT) ratio, indicating all constructs in our model are empirically distinct from each other. From Table 3, it is evident that all reported values fall below the acceptable threshold of 0.9 (Henseler *et al.*, 2015; Kline, 2011). Thus, all requisite criteria have been fulfilled and our measurement model stands confirmed.

4.1.5 Common method bias. Behavioural research is plagued by the problem of common method variance (CMV), which can be attributed to errors in the measurement method (Podsakoff *et al.*, 2003). When CMV affects relationship between constructs in a study, common method bias exists (Kock and Hadaya, 2018). To control for CMB, we have applied

Table 2. Measurement model output

Constructs	Items	Factor loadings	Cronbach's α	CR	AVE
DTI (reflective-reflective)			0.891	0.905	0.401
	ATM	0.694	0.786	0.867	0.702
	DC	0.807	0.797	0.866	0.625
	AE	0.795	0.839	0.901	0.677
	FP	0.830	0.87	0.896	0.652
PE (reflective-reflective)			0.94	0.945	0.502
	CD	0.833	0.841	0.887	0.668
	CCC	0.901	0.892	0.908	0.598
	SC	0.9	0.919	0.943	0.627
	PR	0.895	0.921	0.939	0.641
TS (reflective-reflective)			0.889	0.909	0.539
	FOMO	0.898	0.87	0.899	0.647
	CO	0.884	0.829	0.992	0.672

Source: Table by authors

Table 3. Heterotrait–Monotrait ratio (HTMT)

Constructs	DTI	TS	PE
DTI	0.633		
TS	0.527	0.728	
PE	0.301	0.524	0.699

Source: Table by authors

Harman's single factor test (Korsgaard and Roberson, 1995). All the items were loaded onto a single factor, which explained 33% of the variance of all the variables. This is less than the recommended 50% threshold (Kock and Hadaya, 2018; Rezaei *et al.*, 2022a, 2022b) signifying that CMB is not a concern in our present study.

4.2 Structural model assessment

The structural model delineates the relationships between latent constructs (Hair *et al.*, 2017).

4.2.1 Multicollinearity. Before we check for the structural relationships, it is important to ensure that the model is free from multi-collinearity issues (Rezaei *et al.*, 2022a). For this purpose, VIF values have been examined, which lie below the acceptable limit of 5 indicating non-existence of collinearity (Hair *et al.*, 2019b).

4.2.2 Statistical significance of path coefficients. Next, strength of relationships was assessed with an analysis of path coefficients. Following the suggestions of Hair *et al.* (2017), bootstrapping procedure was done (with 10,000 sub-samples) for testing statistical significance of path coefficients. All path coefficients were found to be significant at 5% significance level except that of DTI to PE (Table 4). We find DTI (0.530) to have a very strong effect on TS. Similarly, TS (−0.524) was also found to exert a very strong inverse effect on PE. Thus, *H2* and *H3* have been supported.

4.2.3 Coefficient of determination (R^2). The model's explanatory power was assessed with the help of R^2 (Shmueli and Koppius, 2011). While interpretation of R^2 values varies with discipline and context, as a general rule R^2 values of 0.25, 0.50 and 0.75 can be regarded as weak, moderate and substantial, respectively (Hair *et al.*, 2011; Henseler *et al.*, 2009). For our model, an R^2 value of 28.3 is reported indicating moderate explanatory power.

4.2.4 Effect size, (f^2). We have also estimated f^2, which accounts for variation in R^2 with subsequent exclusion of predictor variables from the model one at a time. Thumb rules developed for interpretation state that f^2 values of 0.35, 0.15 and 0.02 signify large, medium and small effect, respectively (Chin, 2010). Observed values (Table 5) indicate that DTI has a large effect on technostress, and no effect on PE, while TS has a small effect on PE.

The structural model has been given in Figure 2.

Path	Original sample (O)	Sample mean (M)	SD (STDEV)	T Statistics (|O/STDEV|)	p values
DTI → TS	0.530	0.528	0.057	9.294	0.000
DTI → PE	0.018	0.014	0.068	0.252	0.786
TS → PE	−0.524	0.523	0.067	7.759	0.000

Source: Table by authors

Table 4.
Path coefficients

Constructs	DTI	TS	PE
DTI		0.387	0.00
TS			0.31
PE			

Source: Table by authors

Table 5.
Assessing effect size: f – square

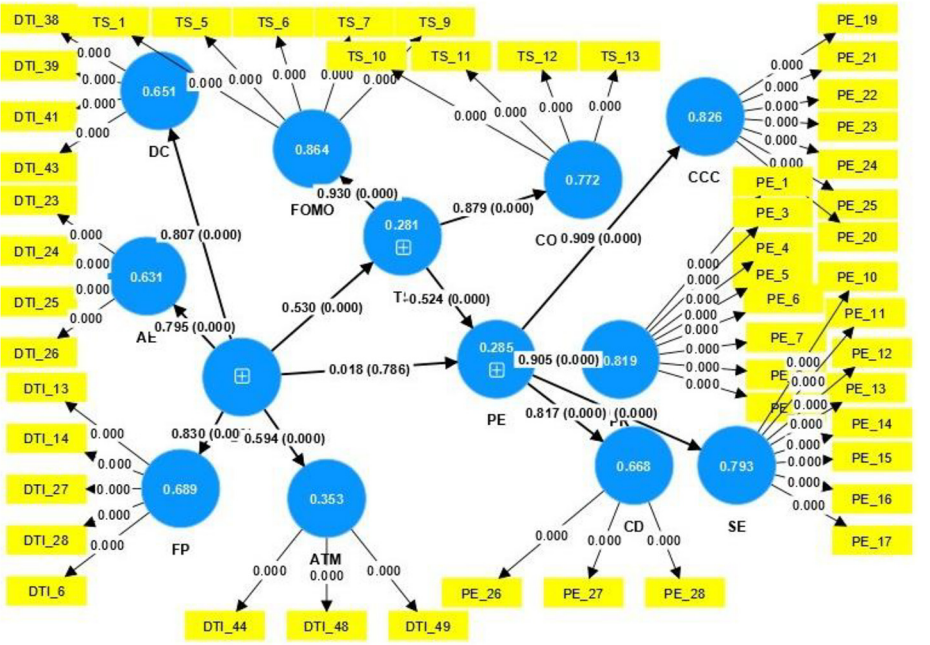


Figure 2.
Structural model

Source: Figure by author

4.3 Mediation analysis

Mediation analysis has been conducted following the guidelines given by Hair *et al.* (2017). First, we check the specific indirect effect in the model. The indirect path DTI-TS-PE was found to be significant revealing that DTI has a total indirect effect on PE via TS (Table 6).

Next, we check for the direct effect between DTI and PE in presence of the mediator, TS. The direct path between DTI and PE was found to be insignificant in the presence of the mediator ($\beta = 0.017$, $t = 0.255$, $p > 0.05$). As the direct path has been rendered insignificant with the introduction of a mediating variable, the results indicate complete mediation. The effect of DTI on PE is being fully mediated through TS (Table 7). Moreover, the R^2 value on introduction of mediator increased from 0.087 to 28.3. These results are in line with existing research contending that complexities associated with learning in a technologically enhanced environment, as well as fears of redundancy invoke technostress (Loh *et al.*, 2022). The prominence of technostress here is so high that individuals are unable to learn optimally in a digitally tailored environment. Thus, because of TS, PE levels fall when learning from a Digitally Taylored course. *H4* has been accepted.

Table 6.
Specific indirect effect

Path	Original sample (O)	Sample mean (M)	SD (STDEV)	T statistics (O/STDEV)	*p* values
DTI → TS → PE	0.277	0.280	0.051	5.422	0.000

Source: Table by authors

4.4 Assessing predictive relevance using partial least squares predict

We have applied PLSPredict in this paper to estimate the out-of-sample explanatory power of our model (Danks and Ray, 2018; Shmueli *et al.*, 2016), in addition to R^2 statistics discussed above (which only give the in-sample predictive relevance). This entails that PLSPredict is capable of assessing the accuracy of a model even when predicting the outcome value of new cases (Shmueli *et al.*, 2019). PLSPredict is based out of the concept of training sample (part of the complete data set used for estimating model parameters) and holdout samples (remaining part of the dataset not used for model estimation) (Hair *et al.*, 2019b). As a holdout sample-based procedure, PLSPredict generates case-level predictions on a construct or item-level. We have evaluated the predictive relevance of our model in line with suggestions provided by Shmueli *et al.* (2016, 2019) and Hair *et al.* (2019a, 2019b). We initialized the PLSPredict process using 10 folds ($k = 10$). Preliminarily, we made sure that the training sample in a single fold fulfilled the minimum sample size requirements (Kock and Hadaya, 2018), which were calculated using G*Power software. We then observed the Q^2 Predict values for PLS-SEM model. Positive Q^2 Predict values, as noted for PE, signify that PLS-SEM analysis for indicators of our main dependent variable (PE, here) outperform the most naïve benchmark- linear regression model, (i.e. the indicator means from the training sample). Following this, we examined the distribution of prediction errors in our model. We found them to be asymmetrically distributed. We have thus, used mean absolute error (MAE) values obtained for PLS-SEM and compared them with LM benchmark. It is evident from Table 8, that MAE values for majority of the indicators in the PLS-SEM analysis return smaller prediction errors compared to the LM, indicating medium predictive power of our model (Shmueli *et al.*, 2019).

5. Discussion

The present study was designed to assess whether students perceive themselves as more employable after completing a Digitally Taylorized implementation of online courses (such as MOOCs), and whether this relationship is mediated by technostress. Our primary finding indicates that the more highly Taylorized students perceive a digital learning environment to be, the more the level of technostress they experience. This indicates that Digitally Taylored implementations of courses can induce technology-related stress for learners in the Indian subcontinent. Students face a lot of technical difficulties when using these platforms which gives rise to technostress. In a country like India, with a huge digital divide, and infrastructural resources that do not support mass scale digitization, technostress experienced by online learners has been found to be high (Jena, 2015). The easy availability of so many courses can also bring about the problem of overload, i.e. students may struggle with the fear of being rendered obsolete no matter how many courses they do on these platforms (Kumpikaitė-Valiūnienė *et al.*, 2021; Slack and Priestley, 2022). These results are in line with postulations of P-E fit theory, whereby misfit between environment and the individuals causes stress (Edwards *et al.*, 1998).

Our results also indicate that the experienced technostress negatively impacts students' PE. Stress can hamper self-confidence and efficacy beliefs, which are central to development

Path	Original sample (O)	Sample mean (M)	SD (STDEV)	T statistics (O/STDEV)	*p* values
DTI → PE	0.018	0.018	0.067	0.255	0.786

Source: Table by authors

Table 7. Direct effect in the presence of mediator

Items of the dependent variable	PLS-SEM Q2 PREDICT	PLS-SEM MAE	LM MAE	PLS-SEM-LM MAE
PE_1	0.28	0.866	0.924	−0.058
PE_3	0.224	0.953	0.956	−0.003
PE_4	0.191	0.93	0.959	−0.029
PE_5	0.329	0.748	0.786	−0.038
PE_6	0.283	0.872	0.921	−0.049
PE_7	0.305	0.778	0.799	−0.021
PE_8	0.284	0.802	0.809	−0.007
PE_9	0.314	0.779	0.788	−0.009
PE_10	0.385	0.76	0.747	0.013
PE_11	0.335	0.773	0.792	−0.019
PE_12	0.335	0.769	0.786	−0.017
PE_13	0.415	0.761	0.756	0.005
PE_14	0.327	0.84	0.838	0.002
PE_15	0.28	0.801	0.771	0.03
PE_16	0.353	0.82	0.786	0.034
PE_17	0.393	0.782	0.803	−0.021
PE_19	0.308	0.839	0.83	0.009
PE_20	0.307	0.802	0.821	−0.019
PE_21	0.468	0.642	0.649	−0.007
PE_22	0.355	0.701	0.715	−0.014
PE_23	0.354	0.791	0.77	0.021
PE_24	0.289	0.765	0.781	−0.016
PE_25	0.312	0.773	0.794	−0.021
PE_26	0.294	0.872	0.898	−0.026
PE_27	0.187	0.911	0.917	−0.006
PE_28	0.401	0.754	0.765	−0.011

Table 8.
PLS predict results for target construct

Source: Table by authors

of employability self-perceptions (Álvarez-González *et al.*, 2017). This finding is also supported by longitudinal research conducted in Italy where technostress negatively influenced students' PE (Schettino *et al.*, 2022).

Further, the major finding of our study is that the capability of digitally tailored platforms to influence students' PE is mediated completely through how much technostress they experience. We discuss this result in light of Taylor's maxim "in the past, man has been first, in the future the system will be first" (Taylor, 1911, p. 7), stressing the need for optimal functioning of systems for desired outcomes. Due to the technical complexities associated with digital platforms, students do not feel their skill-sets are compatible with contemporary career requirements even after completing highly Taylorized courses. The significance of technostress here is so high that students find themselves unable to learn despite an optimal digitally Taylored course. These results support findings of previous studies which contend that fear of being rendered obsolete or redundant, as well as difficulties associated with technology-enhanced learning create technostress (Loh *et al.*, 2022). An individual's comfort level with technology plays a key role in determining the success of Digitally Taylored online learning platforms (Johnson *et al.*, 2008). Thus, because of technostress, PE levels fall when learning from a Digitally Taylored course. These results highlight the most fundamental notion of Taylorist ideology, wherein good systems are necessary to creating competent men (Taylor, 1911). For Digitally Taylorized courses to be effective in generating positive student outcomes, first a digital infrastructure system that can facilitate this is needed. Finally, we also find that our model holds medium predictive relevance indicating

that our explanatory model predicts PE sufficiently well. Thus our results can be generalized from the sample to population of interest (Shmueli *et al.*, 2016).

6. Implications and future research agenda

The findings of our study present some important implications for research and practice. These are discussed in detail below.

6.1 Theoretical implications

The findings of our study present important theoretical implications for existing research in the field of Digital Taylorism. First, we have operationalized the application of Digital Taylorism in an online learning environment. This is an important contribution considering the largely conceptual nature of work in the area of Taylorism, and its extension, Digital Taylorism. While recently published articles do place MOOCs as Taylorizing elements in a technologically enhanced learning space (Mirrlees and Alvi, 2020), to the best of our knowledge, ours is one of the pioneering papers to empirically assess perceptions regarding the implementation of Digitally Taylored online courses, and their relationship with PE of students. Without an empirical assessment of student beliefs in this regard, it would be impossible to evaluate the acceptance of Digital Taylorism in a student-centric educational context.

We also contribute significantly to literature by developing a framework wherein technostress completely mediates the relationship between DTI and PE. This finding is especially significant since it iterates the all-encompassing role played by technology. In a country like India, with a huge digital divide, and infrastructural resources that do not support mass scale digitization, technostress experienced by online learners has been found to be high (Jena, 2015). The prominence of technostress in the model is such that only when technostress is low, will highly Taylorized digital courses succeed in enhancing PE of students. By introducing technostress in the model, we have been able to identify how structuration processes need to be optimised or maximizing student outcomes. Alienation, depersonalization and bureaucratization are some common by-products of scientific management (Merkle, 2022). Our finding that courses perceived as highly Taylorized cause significant amount of technostress highlights these burdens. Stress has become an inevitable part of the modern-day educational setting (Flinchbaugh *et al.*, 2012). In a traditional classroom, teachers play an instrumental role in managing student stress. However, in a Digitally Taylored environment, instructor–student interaction is minimal, necessitating that teaching approaches be redefined (Gil-Jaurena and Domínguez, 2018). Teacher–student relationships are at the core of education, and have an impact on student success factors such as course satisfaction, learning approaches, retention and achievement (Hagenauer and Volet, 2014). In a Digitally Taylorized course implementation, the role of instructor is highly mechanistic. The impersonalized environment induces feelings of alienation from peers and instructors. Yet, the Taylorization of these e-courses is important if the long standing aim of global convergence of education is to be achieved. What stands to be understood here is that the highly mechanized Digitally Taylored environment largely ignores the behavioural aspects of learners. Going forth it is important that theory supplements DTIs with a behavioural focus. This will allow for behavioural issues to be managed while providing optimal structuration of courses. Future researchers can conduct comparative research to understand the effect of instructor–student interaction on the relationship between Digitally Taylorized implementations and student outcomes.

Thus, we observe that technology enhanced learning is not without its challenges. Future researchers can try to identify the different types of training that can be provided to

students to increase comfort with technology and reduce technostress. Longitudinal studies can be designed to establish whether digitally tailored online environments are able to positively impact PE upon successful implementation of such training interventions.

Finally, our model demonstrates medium predictive power in addition to explanatory power. This implies that the developed framework can be generalized to even out-of-sample cases. Further research can take a cross-cultural perspective to understand whether the results hold across different socio-technical contexts.

6.2 Managerial implications

Digitally Taylored online learning platforms hold the key for future expansion of higher education owing to their ability to provide learning opportunities for throes of students (Lee *et al.*, 2021; Narang *et al.*, 2022). MOOCs are a great attempt by Taylorist administrators to improve access, efficiency and quality of education (Mirrlees and Alvi, 2020). Moreover, the easy availability of occupation oriented courses on e-learning platforms make MOOCs attractive to students for becoming work-ready (Goglio and Bertolini, 2021). In fact these Digitally Taylored MOOCs play a momentous role in tackling the employability skill gap, to reduce the consequent economic burden of training for employers (Singh and Singh, 2017). But the handover from physical learning environments to Digitally Taylored online environments is not yet complete. The authors identify two major issues in this respect. First, Taylorism rests on the central tenet of dividing work into small tasks, and then using specialised division of labour to perform those tasks (Taylor, 1911). When it comes to implementations of Digital Taylorism in learning context, such division of labour should be practiced from the ideation to creation and final implementation stage of the MOOC (Gil-Jaurena and Domínguez, 2018). However, we find that no such division of labour is apparent, and often instructors prepare MOOCs without any training (Baggaley, 2013). There is need to employ technology experts who can train instructors on specialised aspects of preparing the MOOC so that effective learning can take place. Second, all DTIs need to incorporate a behavioural element to control for the overpowering role of technology. By managing behavioural issues along with structuration when implementing the course, the impact on student outcomes stands to gain multi-fold.

The findings of our study also force us to rethink the importance of "humans" in all human-machine interactions. The technical difficulties experienced, along with lack of comfort with digital assignments and study mode, are possible reasons which make technostress emerge as a prominent factor determining student outcomes. But, the lack of a human, emotional connection can also be a major hurdle in delivering effective student outcomes using this approach (Sinha *et al.*, 2020). Baggaley (2013) succeed at capturing the nerve of the problem, by stating that "In large populations particularly, the technology is maximized while human contact is minimized, and isolation and psychological distance are amplified". Populous countries like India are especially prone to overlooking the human touch in education. For effective learning to take place, the space for interactions with teachers, and even peers is crucial (Bransford *et al.*, 1999; Mayer, 2003). These importance of these interactions is such that Zhao *et al.* (2022a) in their study concluded that support from administration was crucial for alleviating technostress amongst students, more than ICT competence, which alone had no impact on students' technostress. When these interactions have to be mediated via technology, they become difficult, as is the case in e-learning environments (Johnson *et al.*, 2008). Simple solutions such as facilitating students' access to the course instructor, putting audio/video discussion forums in place or scheduling a live question & answer (Q/A) session for dealing with queries can go a long way in establishing the human touch. Technology common rooms can be created wherein problems faced

during the course can be discussed with peers, instructors and technical support staff in real-time.

Further, we can also use technology to combat the countereffects created through technology. In this regard, metaverse environments, can generate digital imitations of a physical world, (such as a classroom) can be created to foster social interactions (Kye *et al.*, 2021). These simulated, 3D, artificially intelligent environments that facilitate unified communication and dynamic interactions between learners using digital artifacts, such as avatars (Mystakidis, 2022). These virtual classrooms filled with avatars of learners, instructors and support staff can make alleviate stress, and help students learn better. Thus, for improving learning outcomes from Digitally Taylored programs, certain reforms are in order that can bring the human touch to online learning, improve the mentor–mentee bond, and consequently lessen the prominence of technostress.

7. Conclusion

Lauded for being the top pioneer in management thought and practice through the past 200 years (Schachter, 2010), Taylor's reputation and his principles still endure today. In this article, we deconstruct these principles for interpreting and implementing Taylorization of education in a digital setting. We have also empirically studied the implications of its implementation for student employability in a changing business milieu. The rapid scale of technological progress and changing labour market demands require that that singular attention be given to development of individual employability over the course of their careers and job switches (Heymann *et al.*, 2022). The need to continuously reskill has become a prerequisite for employability (Brynjolfsson *et al.*, 2014). Online learning models such as MOOCs, a categorical implementation of Digital Taylorism in the online learning context, provide the perfect educational fix when mismatch between skill-sets and industry demands arises. Thus, in this study, we have examined the relationship between student perceptions of DTI (through MOOCs), technostress and employability. Our results indicate that perceptions of DTI regarding online courses relate to TS and PE in students in professional courses in India. Moreover, we have also found empirical support for our conceptual framework which indicates that TS completely mediates the relationship between students perceptions concerning DTI and PE.

DTI of online courses have the potential to offer a wealth of opportunities for occupation-oriented learning irrespective of social background, age, gender, etc. However, for them to be truly effective, challenges like technostress need to be dealt with. Learning outcomes from Digitally Taylored programs can be greatly improved by instating simple reforms that ensure human touch is not lost in an otherwise virtual environment. Strong mentor–mentee bonds developed through quality interactions between the instructor and students can help counter the effects of technostress, and increase PE of students in this dynamic technological landscape. The findings of our study are limited by the prevailing technological contexts in the educational setting. As technostress is dependent on context, the obtained results may vary for different socio-technical milieus.

Thus, with this article, we have revisited Taylor's principles and expanded them into the realm of education. We have efficaciously positioned Taylorism in a contemporary, post-industrial, digitized academic setting, thereby challenging historical notions that question its applicability in the innovative industries of post-industrial era. We advance a notion that Taylorism, while necessary for standardizing such massive online courses while maintaining requisite quality, needs to be supplemented (and not replaced) with behavioural theories which can add human touch to structure.

References

Al-Imarah, A.A. and Shields, R. (2019), "MOOCs, disruptive innovation and the future of higher education: a conceptual analysis", *Innovations in Education and Teaching International*, Vol. 56 No. 3, pp. 258-269.

Altass, P. and Wiebe, S. (2017), "Re-imagining education policy and practice in the digital era", *Journal of the Canadian Association for Curriculum Studies (JCACS)*, Vol. 15 No. 2.

Álvarez-González, P., López-Miguens, M.J. and Caballero, G. (2017), "In university students: developing an integrated model", *Career Development International*, Vol. 22 No. 3, pp. 280-299, doi: 10.1108/CDI-08-2016-0135.

Ayyagari, R., Grover, V. and Purvis, R. (2011), "Technostress: technological antecedents and implications", *MIS Quarterly*, Vol. 35 No. 4, pp. 831-858.

Baggaley, J. (2013), "MOOC rampant", *Distance Education*, Vol. 34 No. 3, pp. 368-378, doi: 10.1080/01587919.2013.835768.

Bagozzi, R.P. and Yi, Y. (1988), "On the evaluation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 16 No. 1, pp. 74-94, doi: 10.1007/BF02723327.

Bennett, D. and Ananthram, S. (2021), "Studies in higher education development, validation and deployment of the EmployABILITY scale", *Studies in Higher Education*, Vol. 47 No. 7, pp. 1-15, doi: 10.1080/03075079.2021.1888079.

Berntson, E. and Marklund, S. (2007), "The relationship between perceived employability and subsequent health", *Work and Stress*, Vol. 21 No. 3, pp. 279-292, doi: 10.1080/02678370701659215.

Blake, A.M. and Moseley, J.L. (2010), "One hundred years after the principles of scientific management: Frederick Taylor's life and impact on the field of human performance technology", *Performance Improvement*, Vol. 49 No. 4, pp. 27-34.

Borle, P., Reichel, K. and Voelter-Mahlknecht, S. (2021), "Is there a sampling bias in research on work-related technostress? A systematic review of occupational exposure to technostress and the role of socioeconomic position", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 4, p. 2071.

Bransford, J.D., Brown, A.L. and Cocking, R.R. (Eds) (1999), *How People Learn: Brain, Mind, Experience, and School., How People Learn: Brain, Mind, Experience, and School*, National Academy Press, Washington, DC.

Brod, C. (1984), *Technostress: The Human Cost of the Computer Revolution*, Addison-Wesley Publishing Company, Reading, PA.

Brown, P., Lauder, H. and Ashton, D. (2011), "Digital Taylorism", *The Global Auction: The Broken Promises of Education, Jobs, and Incomes*, Oxford University Press, Oxford, pp. 65-82.

Brynjolfsson, E., Mcafee, A. and Spence, M. (2014), "New world order: labor, capital, and ideas in the power law economy", *Foreign Affairs*, Vol. 93 No. 4, pp. 44-53.

Cao, X., Khan, A.N., Zaigham, G.H.K. and Khan, N.A. (2019), "The stimulators of social media fatigue among students: role of moral disengagement", *Journal of Educational Computing Research*, Vol. 57 No. 5, pp. 1083-1107, doi: 10.1177/0735633118781907.

Cavus, N. and Zabadi, T. (2014), "A comparison of open source learning management systems", *Procedia - Social and Behavioral Sciences*, Vol. 143, pp. 521-526, doi: 10.1016/j.sbspro.2014.07.430.

Chin, W.W. (2010), "How to write up and report PLS analyses", *Handbook of Partial Least Squares*, Springer, Berlin, Heidelberg, pp. 655-690.

Copley, F.B. (1923), *Frederick W. Taylor: Father of Scientific Management*, Vol. 2, Harper and brothers, New York.

Cuyper, N.D., Bernhard-Oettel, C., Berntson, E., Witte, H.D. and Alarco, B. (2008), "Employability and employees' well-being: mediation by job insecurity", *Applied Psychology*, Vol. 57 No. 3, pp. 488-509, doi: 10.1111/j.1464-0597.2008.00332.x.

Danks, N.P. and Ray, S. (2018), "Predictions from partial least squares models", in Ali, F., Rasoolimanesh, S.M. and Cobanoglu, C. (Eds), *Applying Partial Least Squares in Tourism and Hospitality Research*, Emerald Publishing Limited, Bingley, pp. 35-52, doi: 10.1108/978-1-78756-699-620181003.

Daradoumis, T., Bassi, R., Xhafa, F. and Caballe, S. (2013), "A review on massive e-learning (MOOC) design, delivery and assessment", *2013 Eighth International Conference on P2P, Parallel, Grid, Cloud and Internet Computing*, IEEE, pp. 208-213, doi: 10.1109/3PGCIC.2013.37.

Delfanti, A. and Frey, B. (2021), "Humanly extended automation or the future of work seen through amazon patents", *Science, Technology, and Human Values*, Vol. 46 No. 3, pp. 655-682, doi: 10.1177/0162243920943665.

Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P. and Kaiser, S. (2012), "Guidelines for choosing between multi-item and single-item scales for construct measurement: a predictive validity perspective", *Journal of the Academy of Marketing Science*, Vol. 40 No. 3, pp. 434-449, doi: 10.1007/s11747-011-0300-3.

Drange, I., Bernstrøm, V.H. and Mamelund, S.-E. (2018), "Are you moving up or falling short? An inquiry of skills-based variation in self-perceived employability among Norwegian employees", *Work, Employment and Society*, Vol. 32 No. 2, pp. 387-406, doi: 10.1177/0950017017749720.

Edwards, J.R., Caplan, R.D. and van Harrison, R. (1998), "Person-environment fit theory", *Theories of Organizational Stress*, Vol. 28 No. 1, pp. 67-94.

Flinchbaugh, C.L., Moore, E.W.G., Chang, Y.K. and May, D.R. (2012), "Student well-being interventions: the effects of stress management techniques and gratitude journaling in the management education classroom", *Journal of Management Education*, Vol. 36 No. 2, pp. 191-219, doi: 10.1177/1052562911430062.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50, doi: 10.2307/3151312.

Fugate, M., van der Heijden, B., de Vos, A., Forrier, A. and de Cuyper, N. (2021), "Is what's past prologue? A review and agenda for contemporary employability research", *Academy of Management Annals*, Vol. 15 No. 1, pp. 266-298, doi: 10.5465/annals.2018.0171.

Gil-Jaurena, I. and Domínguez, D. (2018), "Teachers' roles in light of massive open online courses (MOOCs): evolution and challenges in higher distance education", *International Review of Education*, Vol. 64 No. 2, pp. 197-219, doi: 10.1007/s11159-018-9715-0.

Goette, L., Bendahan, S., Thoresen, J., Hollis, F. and Sandi, C. (2015), "Stress pulls us apart: anxiety leads to differences in competitive confidence under stress", *Psychoneuroendocrinology, Elsevier*, Vol. 54, pp. 115-123.

Goglio, V. and Bertolini, S. (2021), "The contribution of MOOCs to upskilling the labor force", *Journal of Workplace Learning*, Vol. 33 No. 7, pp. 561-574, doi: 10.1108/JWL-10-2020-0159.

Gorbatov, S., Hamori, M., Khapova, S.N., Lysova, E.I. and Oostrom, J.K. (2020), "More than a course: participation in MOOCs to signal professional value", *Socioeconomics, Diversity, and the Politics of Online Education*, IGI Global, pp. 50-77, doi: 10.4018/978-1-7998-3583-7.ch004.

Grachev, M. and Rakitsky, B. (2013), "Historic horizons of Frederick Taylor's scientific management", *Journal of Management History*, Vol. 19 No. 4, pp. 512-527, doi: 10.1108/JMH-05-2012-0043.

Günsel, A. and Yamen, M. (2020), "Digital Taylorism as an answer to the requirements of the new era", *Agile Business Leadership Methods for Industry 4.0*, Emerald Publishing, Bingley, pp. 103-119, doi: 10.1108/978-1-80043-380-920201007.

Hagenauer, G. and Volet, S.E. (2014), "Teacher–student relationship at university: an important yet under-researched field", *Oxford Review of Education*, Vol. 40 No. 3, pp. 370-388, doi: 10.1080/03054985.2014.921613.

Hair, J.F., Hult, G.M., Ringle, C.M. and Sarstedt, M. (2014), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Sage Publications, Thousand Oaks, CA.

Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2017), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed., Sage Publications, Thousand Oaks, CA.

Hair, J.F., Ringle, C.M. and Sarstedt, M. (2011), "PLS-SEM: indeed a silver bullet", *Journal of Marketing Theory and Practice, Routledge*, Vol. 19 No. 2, pp. 139-152, doi: 10.2753/MTP1069-6679190202.

Hair, J.F., Ringle, C.M., Gudergan, S.P., Fischer, A., Nitzl, C. and Menictas, C. (2019a), "Partial least squares structural equation modeling-based discrete choice modeling: an illustration in modeling retailer choice", *Business Research*, Vol. 12 No. 1, pp. 115-142, doi: 10.1007/s40685-018-0072-4.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019b), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2-24, doi: 10.1108/EBR-11-2018-0203.

Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115-135, doi: 10.1007/s11747-014-0403-8.

Henseler, J., Ringle, C.M. and Sinkovics, R.R. (2009), "The use of partial least squares path modeling in international marketing", in Sinkovics, R.R. and Ghauri, P.N. (Eds), *New Challenges to International Marketing: Advances in International Marketing*, Emerald Group Publishing Limited, Bingley, Vol. 20, pp. 277-319, doi: 10.1108/S1474-7979(2009)0000020014.

Heymann, P., Bastiaens, E., Jansen, A., van Rosmalen, P. and Beausaert, S. (2022), "A conceptual model of students' reflective practice for the development of employability competences, supported by an online learning platform", *Education + Training*, Vol. 64 No. 3, pp. 380-397, doi: 10.1108/ET-05-2021-0161.

Hillage, J. and Pollard, E. (1998), "Employability: developing a framework for policy analysis", *Labour Market Trends*, Vol. 107 No. 85, pp. 83-84.

Holford, W.D. (2019), "The future of human creative knowledge work within the digital economy", *Futures*, Vol. 105, pp. 143-154, doi: 10.1016/j.futures.2018.10.002.

Huang, L. and Zhang, T. (2022), "Perceived social support, psychological capital, and subjective well-being among college students in the context of online learning during the COVID-19 pandemic", *The Asia-Pacific Education Researcher*, Vol. 31 No. 5, pp. 563-574, doi: 10.1007/s40299-021-00608-3.

Jacoby, J. (2002), "Stimulus-organism-response reconsidered: an evolutionary step in modeling (consumer) behavior", *Journal of Consumer Psychology*, Vol. 12 No. 1, pp. 51-57, doi: 10.1207/s15327663jcp1201_05.

Jain, N., Thomas, A., Gupta, V., Ossorio, M. and Porcheddu, D. (2022), "Stimulating CSR learning collaboration by the mentor universities with digital tools and technologies – an empirical study during the COVID-19 pandemic", *Management Decision*, Vol. 60 No. 10, pp. 2824-2848, doi: 10.1108/MD-12-2021-1679.

Jena, R.K. (2015), "Technostress in ICT enabled collaborative learning environment: an empirical study among Indian academician", *Computers in Human Behavior*, Vol. 51, pp. 1116-1123, doi: 10.1016/j.chb.2015.03.020.

Johnson, R.D., Hornik, S. and Salas, E. (2008), "An empirical examination of factors contributing to the creation of successful e-learning environments", *International Journal of Human-Computer Studies*, Vol. 66 No. 5, pp. 356-369, doi: 10.1016/j.ijhcs.2007.11.003.

Kaplan, A.M. and Haenlein, M. (2016), "Higher education and the digital revolution: about MOOCs, SPOCs, social media, and the cookie monster", *Business Horizons*, Vol. 59 No. 4, pp. 441-450, doi: 10.1016/j.bushor.2016.03.008.

Katz, D. and Kahn, R.L. (1978), *The Social Psychology of Organizations*, Wiley, New York.

Kee, D.M.H., Anwar, A., Shern, L.Y. and Gwee, S.L. (2023), "Course quality and perceived employability of Malaysian youth: the mediating role of course effectiveness and satisfaction", *Education and Information Technologies*, pp. 1-18, doi: 10.1007/s10639-023-11737-1.

Kemp, L.J. (2013), "Modern to postmodern management: developments in scientific management", *Journal of Management History*, Vol. 19 No. 3, pp. 345-361, doi: 10.1108/JMH-02-2011-0005.

Khan, I.U., Hameed, Z., Yu, Y. and Khan, S.U. (2017), "Assessing the determinants of flow experience in the adoption of learning management systems: the moderating role of perceived institutional support", *Behaviour and Information Technology*, Vol. 36 No. 11, pp. 1162-1176, doi: 10.1080/0144929X.2017.1362475.

Khatri, P., Duggal, H.K., Dutta, S., Kumari, P., Thomas, A., Brod, T. and Colimoro, L. (2023), "Unveiling heterogenous knowledge-oriented leadership and knowledge acquisition based hybrid work agility of knowledge workers", *Journal of Knowledge Management*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/JKM-10-2022-0793.

Kim, J.H. and Park, J.W. (2019), "The effect of airport self-service characteristics on passengers' perceived value, satisfaction, and behavioral intention: based on the SOR model", *Sustainability (Switzerland)*, Vol. 11 No. 19, doi: 10.3390/su11195352.

Kline, R.B. (2011), *Principles and Practice of Structural Equation Modeling*, 3rd ed., Guilford Press, New York, NY.

Kock, N. and Hadaya, P. (2018), "Minimum sample size estimation in PLS-SEM: the inverse square root and gamma-exponential methods", *Information Systems Journal*, Vol. 28 No. 1, pp. 227-261.

Korsgaard, M.A. and Roberson, L. (1995), "Procedural justice in performance evaluation: the role of instrumental and non-instrumental voice in performance appraisal discussions", *Journal of Management*, Vol. 21 No. 4, pp. 657-669.

Kumpikaitė-Valiūnienė, V., Aslan, I., Duobienė, J., Glińska, E. and Anandkumar, V. (2021), "Influence of digital competence on perceived stress, burnout and well-being among students studying online during the COVID-19 lockdown: a 4-country perspective", *Psychology Research and Behavior Management*, Vol. 14, pp. 1483-1498, doi: 10.2147/PRBM.S325092.

Kye, B., Han, N., Kim, E., Park, Y. and Jo, S. (2021), "Educational applications of metaverse: possibilities and limitations", *Journal of Educational Evaluation for Health Professions*, Vol. 18, doi: 10.3352/jeehp.2021.18.32.

Lauer Schachter, H. (2016), "Frederick Winslow Taylor, Henry Hallowell Farquhar, and the dilemma of relating management education to organizational practice", *Journal of Management History*, Vol. 22 No. 2, pp. 199-213, doi: 10.1108/JMH-07-2015-0193.

Lee, S., Choi, Y.-J. and Kim, H.-S. (2021), "The accurate measurement of students' learning in e-learning environments", *Applied Sciences*, Vol. 11 No. 21, p. 9946, doi: 10.3390/app.

Li, F. and Wang, L. (2020), "An empirical study on distance education and job match", *Sustainability (Switzerland)*, Vol. 12 No. 2, p. 619, doi: 10.3390/su12020619.

Liapis, A., Maratou, V., Panagiotakopoulos, T., Katsanos, C. and Kameas, A. (2022), "UX evaluation of open MOOC platforms: a comparative study between moodle and open edX combining user interaction metrics and wearable biosensors", *Interactive Learning Environments*, pp. 1-15, doi: 10.1080/10494820.2022.2048674.

Lim, K.F. (2014), "Education: learning from the MOOCs model", *Chemistry in Australia*, No. Jun 2014, p. 37.

Liu, H.Y. (2022), "Digital Taylorism in China's e-commerce industry: a case study of internet professionals", *Economic and Industrial Democracy*, Vol. 44 No. 1, p. 143831X2110688, doi: 10.1177/0143831X211068887.

Loh, X.-K., Lee, V.-H., Loh, X.-M., Tan, G.W.-H., Ooi, K.-B. and Dwivedi, Y.K. (2022), "The dark side of mobile learning via social media: how bad can it get?", *Information Systems Frontiers*, Vol. 24 No. 6, pp. 1887-1904, doi: 10.1007/s10796-021-10202-z.

Maclean, M., Harvey, C. and Clegg, S.R. (2017), "Organization theory in business and management history: present status and future prospects", *Business History Review*, Vol. 91 No. 3, pp. 457-481, doi: 10.1017/S0007680517001027.

Marginson, S. (2017), "Global: yes, mooc is the global higher education game changer", *Understanding Global Higher Education*, Springer, Rotterdam, pp. 147-150.

Martínez-Argüelles, M.-J., Plana-Erta, D. and Fitó-Bertran, À. (2022), "Impact of using authentic online learning environments on students' perceived employability", *Educational Technology Research and Development*, Vol. 71 No. 2, doi: 10.1007/s11423-022-10171-3.

Martínez-Cerdá, J.-F. and Torrent-Sellens, J. (2017), "Formal lifelong e-learning for employability and job stability during turbulent times in Spain", *The International Review of Research in Open and Distributed Learning*, Vol. 18 No. 6, pp. 261-287, doi: 10.19173/irrodl.v18i6.2974.

Martínez-Cerdá, J.-F., Torrent-Sellens, J. and González-González, I. (2020), "Socio-technical e-learning innovation and ways of learning in the ICT-space-time continuum to improve the employability skills of adults", *Computers in Human Behavior*, Vol. 107, p. 105753, doi: 10.1016/j.chb.2018.10.019.

Martínez-Cerdá, J.-F., Torrent-Sellens, J., González-González, I. and Ficapal-Cusí, P. (2018), "Opening the black-box in lifelong e-learning for employability: a framework for a socio-technical e-learning employability system of measurement (STELEM)", *Sustainability*, Vol. 10 No. 4, p. 1014, doi: 10.3390/su10041014.

Mayer, R.E. (2003), "Theories of learning and their application to technology", *Technology Applications in Education: A Learning View*, Lawrence Erlbaum Associates Publishers, Mahwah, NJ, pp. 127-157.

Mehrabian, A. and Russell, J.A. (1974), *An Approach to Environmental Psychology*, The MIT Press, Cambridge.

Merkle, J.A. (2022), *Management and Ideology: The Legacy of the International Scientific Management Movement*, Univ of CA Press, New York, NY.

Mirrlees, T. and Alvi, S. (2020), "Automating higher education: Taylorism and the teaching machines", in Mirrlees, T. and Alvi, S. (Eds), *Selling, Automating and Globalizing Higher Education in the Digital Age*, Routledge, New York, NY, pp. 82-101.

Mohapatra, S. and Mohanty, R. (2017), "Adopting MOOCs for affordable quality education", *Education and Information Technologies*, Vol. 22 No. 5, pp. 2027-2053, doi: 10.1007/s10639-016-9526-5.

Mokgele, K.R.F. and Rothmann, S. (2014), "A structural model of student well-being", *South African Journal of Psychology*, Vol. 44 No. 4, pp. 514-527, doi: 10.1177/0081246314541589.

Moosa, M. and Bekker, T. (2022), "Working online during COVID-19: accounts of first year students experiences and well-being", *Frontiers in Psychology*, Vol. 13, p. 794279, doi: 10.3389/fpsyg.2022.794279.

Morgan, M.S. (1997), "The character of rational economic man", *Dialectik*, Vol. 1997 No. 1, pp. 77-94.

Mystakidis, S. (2022), "Metaverse", *Encyclopedia*, Vol. 2 No. 1, pp. 486-497.

Narang, U., Yadav, M.S. and Rindfleisch, A. (2022), "The 'idea advantage': how content sharing strategies impact engagement in online learning platforms", *Journal of Marketing Research*, Vol. 59 No. 1, pp. 61-78, doi: 10.1177/00222437211017828.

National Science Foundation (2002), *Converging Technologies for Improving Human Performance*, National Science Foundation, Arlington.

Nunnally, B. and Bernstein, I.R. (1994), *Psychometric Theory*, Oxford University Press, New York, NY.

Oh, E.G., Chang, Y. and Park, S.W. (2020), "Design review of MOOCs: application of e-learning design principles", *Journal of Computing in Higher Education*, Vol. 32 No. 3, pp. 455-475, doi: 10.1007/s12528-019-09243-w.

Park, S., Jeong, S. and Ju, B. (2021), "MOOCs in the workplace: an intervention for strategic human resource development", *Human Resource Development International*, Vol. 24 No. 3, pp. 329-340, doi: 10.1080/13678868.2018.1516062.

Payne, S.C., Youngcourt, S.S. and Watrous, K.M. (2006), "Portrayals of F.W. Taylor across textbooks", *Journal of Management History*, Vol. 12 No. 4, pp. 385-407, doi: 10.1108/17511340610692752.

Peaucelle, J.-L. (2000), "From Taylorism to post-Taylorism simultaneously pursuing several management objectives", *Journal of Organizational Change Management*, Vol. 13 No. 5, pp. 452-467.

Penado Abilleira, M., Rodicio-García, M.L., Ríos-de-Deus, M.P. and Mosquera-González, M.J. (2020), "Technostress in Spanish university students: validation of a measurement scale", *Frontiers in Psychology*, Vol. 11, p. 582317, doi: 10.3389/fpsyg.2020.582317.

Peng, M.Y.P., Wang, L., Yue, X., Xu, Y. and Feng, Y. (2021), "A study on the influence of multi-teaching strategy intervention program on college students' absorptive capacity and employability", *Frontiers in Psychology*, Vol. 12, p. 631958, doi: 10.3389/fpsyg.2021.631958.

Pitan, O.S. and Muller, C. (2019), "University reputation and undergraduates' self-perceived employability: mediating influence of experiential learning activities", *Higher Education Research and Development*, Vol. 38 No. 6, pp. 1269-1284, doi: 10.1080/07294360.2019.1634678.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903, doi: 10.1037/0021-9010.88.5.879.

Pruijt, H. (2000), "Smashing Taylorism repainting, modifying, smashing Taylorism", *Journal of Organizational Change Management*, Vol. 13 No. 5, pp. 953-4814.

Qenani, E., MacDougall, N. and Sexton, C. (2014), "An empirical study of self-perceived employability: improving the prospects for student employment success in an uncertain environment", *Active Learning in Higher Education*, Vol. 15 No. 3, pp. 199-213, doi: 10.1177/1469787414544875.

Rezaei, M., Ferraris, A., Busso, D. and Rizzato, F. (2022a), "Seeking traces of democracy in the workplace: effects on knowledge sharing", *Journal of Knowledge Management*, Vol. 26 No. 10, pp. 2528-2557, doi: 10.1108/JKM-02-2021-0103.

Rezaei, M., Giovando, G., Rezaei, S. and Sadraei, R. (2022b), "What are the fundamental knowledge-sharing drivers of small family businesses in the restaurant and fast-food industry?", *British Food Journal*, Vol. 124 No. 7, pp. 2149-2178, doi: 10.1108/BFJ-08-2021-0948.

Ringle, C.M., Wende, S. and Becker, J.-M. (2022), "SmartPLS 4", SmartPLS, Boenningstedt.

Rosendale, J.A. (2017), "Gauging the value of MOOCs: an examination of American employers' perceptions toward higher education change", *Higher Education, Skills and Work-Based Learning*, Vol. 7 No. 2, pp. 141-154, doi: 10.1108/HESWBL-09-2016-0065.

Rothwell, A., Herbert, I. and Rothwell, F. (2008), "Self-perceived employability: construction and initial validation of a scale for university students", *Journal of Vocational Behavior*, Vol. 73 No. 1, pp. 1-12, doi: 10.1016/j.jvb.2007.12.001.

Sablina, S., Kapliy, N., Trusevich, A. and Kostikova, S. (2018), "How MOOC-takers estimate learning success: retrospective reflection of perceived benefits", *The International Review of Research in Open and Distributed Learning*, Vol. 19 No. 5, pp. 21-36, doi: 10.19173/irrodl.v19i5.3768.

Sarstedt, M., Ringle, C.M. and Hair, J.F. (2020), "Partial least squares structural equation modeling", in Homburg, C., Klarmann, M. and Vomberg, A. (Eds), *Handbook of Market Research*, Springer International Publishing, Cham, pp. 1-41, doi: 10.1007/978-3-319-05542-8.

Schachter, H.L. (2010), "The role played by Frederick Taylor in the rise of the academic management fields", *Journal of Management History*, Vol. 16 No. 4, pp. 437-448, doi: 10.1108/17511341011073924.

Schettino, G., Marino, L. and Capone, V. (2022), "The impact of university-related variables on students' perceived employability and mental well-being: an Italian longitudinal study", *Sustainability*, Vol. 14 No. 5, p. 2671, doi: 10.3390/su14052671.

Schultz, T.W. (1961), "Investment in human capital", *The American Economic Review*, Vol. 51 No. 1, pp. 1-17.

Selwyn, N., Bulfin, S. and Pangrazio, L. (2015), "Massive open online change? Exploring the discursive construction of the 'MOOC' in newspapers", *Higher Education Quarterly*, Vol. 69 No. 2, pp. 175-192, doi: 10.1111/hequ.12061.

Shmueli, G. and Koppius, O.R. (2011), "Predictive analytics in information systems research", *MIS Quarterly*, Vol. 35 No. 3, pp. 553-572.

Shmueli, G., Hair, J.F., Ting, H. and Ringle, C.M. (2019), "Predictive model assessment in PLS-SEM: guidelines for using PLSpredict", *European Journal of Marketing*, Vol. 53 No. 11, pp. 2322-2347, doi: 10.1108/EJM-02-2019-0189.

Shmueli, G., Ray, S., Velasquez Estrada, J.M. and Chatla, S.B. (2016), "The elephant in the room: predictive performance of PLS models", *Journal of Business Research*, Vol. 69 No. 10, pp. 4552-4564, doi: 10.1016/j.jbusres.2016.03.049.

Silva, A.P., Lourtie, P. and Aires, L. (2013), "Employability in online higher education: a case study", *The International Review of Research in Open and Distributed Learning*, Vol. 14 No. 1, p. 106, doi: 10.19173/irrodl.v14i1.1262.

Simon, H. (2009), *An Empirically-Based Microeconomics*, Cambridge University Press, Cambridge.

Singh, A. and Singh, L.B. (2017), "E-Learning for employability skills: students perspective", *Procedia Computer Science*, Vol. 122, pp. 400-406, doi: 10.1016/j.procs.2017.11.386.

Sinha, M., Agarwal, V. and Gupta, L. (2020), "Human touch in digital education—a solution", *Clinical Rheumatology*, Vol. 39 No. 12, pp. 3897-3898, doi: 10.1007/s10067-020-05448-y.

Slack, H.R. and Priestley, M. (2022), "Online learning and assessment during the covid-19 pandemic: exploring the impact on undergraduate student well-being", *Assessment and Evaluation in Higher Education*, Vol. 48 No. 3, pp. 1-17, doi: 10.1080/02602938.2022.2076804.

Stoller, A. (2015), "Taylorism and the logic of learning outcomes", *Journal of Curriculum Studies*, Vol. 47 No. 3, pp. 317-333, doi: 10.1080/00220272.2015.1018328.

Talwar, S., Dhir, A., Kaur, P. and Mäntymäki, M. (2020), "Barriers toward purchasing from online travel agencies", *International Journal of Hospitality Management*, Vol. 89, p. 102593, doi: 10.1016/j.ijhm.2020.102593.

Tarafdar, M., Tu, Q., Ragu-Nathan, B.S. and Ragu-Nathan, T.S. (2007), "The impact of technostress on role stress and productivity", *Journal of Management Information Systems*, Vol. 24 No. 1, pp. 301-328, doi: 10.2753/MIS0742-1222240109.

Taylor, F.W. (1911), *The Principles of Scientific Management*, Harper and Brothers, New York, NY.

Thomas, A. (2022), "Promoting IT professionals' tacit knowledge sharing through social capital and web 2.0: the moderating role of absorptive capacity", *Kybernetes*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/K-05-2022-0649.

Trullas, I., Simo, P., Fusalba, O.R., Fito, A. and Sallan, J.M. (2018), "Student-perceived organizational support and perceived employability in the marketing of higher education", *Journal of Marketing for Higher Education*, Vol. 28 No. 2, pp. 266-281, doi: 10.1080/08841241.2018.1488334.

Tymon, A. (2013), "The student perspective on employability", *Studies in Higher Education*, Vol. 38 No. 6, pp. 841-856, doi: 10.1080/03075079.2011.604408.

Upadhyaya, P. and Vrinda (2021), "Impact of technostress on academic productivity of university students", *Education and Information Technologies*, Vol. 26 No. 2, pp. 1647-1664, doi: 10.1007/s10639-020-10319-9.

van Vuuren, T., Peeters, M., Diaz, S.P. and van Veen, B. (2020), "Het verband tussen technostress en duurzame inzetbaarheid: doet leeftijd ertoe?", *Gedrag and Organisatie*, Vol. 33 No. 4.

Vanhercke, D., De Cuyper, N., Peeters, E. and De Witte, H. (2014), "Defining perceived employability: a psychological approach", *Personnel Review*, Vol. 43 No. 4, pp. 592-605, doi: 10.1108/PR-07-2012-0110.

Vermeulen, L. and Schmidt, H.G. (2008), "Learning environment, learning process, academic outcomes and career success of university graduates", *Studies in Higher Education*, Vol. 33 No. 4, pp. 431-451, doi: 10.1080/03075070802211810.

Wagner-Tsukamoto, S. (2007), "An institutional economic reconstruction of scientific management: on the lost theoretical logic of Taylorism", *Academy of Management Review*, Vol. 32 No. 1, pp. 105-117.

Wagner-Tsukamoto, S. (2008), "Scientific management revisited: did Taylorism fail because of a too positive image of human nature?", *Journal of Management History*, Vol. 14 No. 4, pp. 348-372, doi: 10.1108/17511340810893108.

Wang, X., Tan, S.C. and Li, L. (2020a), "Technostress in university students' technology-enhanced learning: an investigation from multidimensional person-environment misfit", *Computers in Human Behavior*, Vol. 105, p. 106208, doi: 10.1016/j.chb.2019.106208.

Wang, X., Tan, S.C. and Li, L. (2020b), "Measuring university students' technostress in technology-enhanced learning: scale development and validation", *Australasian Journal of Educational Technology*, pp. 96-112, doi: 10.14742/ajet.5329.

Weil, M.M. and Rosen, L.D. (1997), *Technostress: Coping with Technology@ Work@ Home@ Play*, Vol. 13, J. Wiley, New York, NY.

Weise, M.R. (2020), *Long Life Learning: Preparing for Jobs That Don't Even Exist Yet*, Wiley, United Kingdom.

Zhai, X., Wang, M. and Ghani, U. (2020), "The SOR (stimulus-organism-response) paradigm in online learning: an empirical study of students' knowledge hiding perceptions", *Interactive Learning Environments, Routledge*, Vol. 28 No. 5, pp. 586-601, doi: 10.1080/10494820.2019.1696841.

Zhao, G., Wang, Q., Wu, L. and Dong, Y. (2022a), "Exploring the structural relationship between university support, students' technostress, and burnout in technology-enhanced learning", *The Asia-Pacific Education Researcher*, Vol. 31 No. 4, pp. 463-473, doi: 10.1007/s40299-021-00588-4.

Zhao, G., Zhao, R., Yan, X., Conceição, S.C.O., Cheng, Z. and Peng, Q. (2022b), "The effects of technostress, intolerance of uncertainty, and ICT competence on learning burnout during COVID-19: a moderated mediation examination", *Asia Pacific Journal of Education*, pp. 1-19, doi: 10.1080/02188791.2022.2071835.

Zhenghao, C., Alcorn, B., Christensen, G., Eriksson, N., Koller, D. and Emanuel, E.J. (2015), "Who's benefiting from MOOCs, and why", *Harvard Business Review*.

Appendix

Table A1. Measures for constructs

Digital taylorism implementation	
Formalization of procedures (FP)	There are well-defined guidelines to access course content
	A timeline has been developed for dealing with my queries
	I can exchange ideas with course instructor using email/chat/discussion forums
	It was easy to register for my course
	Detailed information was available about course content
Datafication of Course (DC)	The course had relevant levels for understanding at the basic, intermediate and professional categories
	Lectures are completely in sync with curriculum outline
	All relevant course material has been uploaded online
	Video Lectures are available in English as well as my native language
	There is a provision for Question/Answer Session related to the course
Automated Evaluation (AE)	"There is a scheme for continuous evaluation throughout the course"
	There is an automated grading system
	MCQ assignments are evaluated immediately
	Grade scores are returned with an automated answer key
Algorithmic Time Management (ATM)	I get automated reminders for submission of my due assignments
	My assignments are evaluated in real-time
	With online learning platforms, I am able to learn faster
Technostress	
Fear of Missing Out (FOMO)	I'm constantly under pressure to apply for courses on online platforms to keep up with my peers
	I worry that I will fall behind my peers if I do not apply for online courses
	If I do not complete online courses, I fear that employers would not be keen to hire me
	Online learning platforms make me feel like a person-technology misfit
	I am always stressed that others will be able to perform better on online courses
Complexity (CO)	I feel I am unable to adapt to the online learning environment
	I feel under-confident about learning using online platforms
	I feel I am not equipped to handle the complexity of online learning platforms
	I am fearful that I will not be able to do justice to my assignments in the online environment
Perceived Employability	
Contemporary Career Compatibility (CCC)	I regularly participate in online courses to reach my career goals
	Certifications received from online learning platforms will be instrumental in getting my dream job
	I feel that the online courses I have done are compatible with my dream job
	Because of doing online courses, I possess the professional attitude that is required for employment
	Interacting with a diverse set of people during my online course has given me the skills to deal with cultural diversity in my future workplace
	I am comfortable working in a team because of all the group assignments I have done on online platforms
	I am comfortable using digital technologies because of the online courses

(*continued*)

Platform Reputation (PR)	The reputation of online learning platform from which I have completed my course(s) will be instrumental in getting my dream job
	Organizations are keen to hire students who have pursued variety of online courses from reputed online platforms
	Organizations specifically want to hire graduates who have done the online courses that I have
	The reputation of online learning platforms in my field of study is very good
	A lot of students want to pursue the online courses that I have
	Platform reputation will help me market myself better to employers
	Organizations specifically want to hire graduates from my stream who have done the online courses that I have
	Graduates who use online learning platforms stand a better chance for employment
Self-confidence (SC)	I am confident of my domain knowledge developed through my online courses
	I keep updating my career-related knowledge and skills (through online learning platforms)
	I am confident in my ability to meet deadlines because of continuous evaluation in my online courses
	I am confident in my ability to multitask because of shuffling between online and in-classroom courses
	I am confident that I can work under pressure after managing so many deadlines of my online and in-classroom courses
	I am confident that I am job-ready in the digital world
	I am confident of a global presence because of diverse online courses that I have done
	I am confident I will be able to handle changing skill requirements
Career Directedness (CD)	I keep updating my career-related knowledge and skills (through online learning platforms)
	I am informed of all career options available to me after completion of my online course
	I am aware of all the job positions I can take after my online course

Source: By authors

Table A1.

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