



The Effect of Chinese EFL Students' Digital Literacy on Their Technostress and Academic Productivity

Jing Wang¹

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Abstract The importance of integrating technologies into second/foreign language (L2) education has garnered increasing attention among scholars in the past decade. It has been exponentially highlighted that L2 educators need to become digitally literate to succeed in the digital world. However, research on the contribution of English as a foreign language (EFL) students' digital literacy to their level of technostress and academic productivity has been left uncharted. To bridge the gap, this study used a quantitative research design via three validated questionnaires to examine whether Chinese EFL students' digital literacy affects their technostress and academic productivity. To this end, a sample of 426 EFL students were invited to fill in an electronic survey. The results of this study, as obtained by structural equation modeling (SEM) and multiple regression, illustrated that EFL students' digital literacy influenced both their technostress and academic productivity. It was also shown that digital literacy could respectively predict 77% and 61% of changes in students' technostress and academic productivity. The study explains the results' implications for EFL educators and policy-makers, who can make more efforts to integrate technologies into L2 education. Finally, the limitations and future lines of research are presented.

Keywords Academic productivity · Digital literacy · EFL students · L2 education · Technostress

Highlights

Introduction

The importance of integrating technologies into second/foreign language (L2) education has garnered increasing attention, and L2 educators need to become digitally literate to succeed in the digital world.

Methods

This study used a quantitative research design via three validated questionnaires to examine whether Chinese EFL students' digital literacy affects their technostress and academic productivity. To this end, a sample of 426 EFL students were invited to fill in an electronic survey.

Results

Structural equation modeling (SEM) and multiple regression, illustrated that EFL students' digital literacy influenced both their technostress and academic productivity. It was also shown that digital literacy could respectively predict 77% and 61% of changes in students' technostress and academic productivity.

Discussion

The study explains the results' implications for EFL educators and policy-makers, who can make more efforts to integrate technologies into L2 education.

✉ Jing Wang
wangjing_lnu2023@163.com

¹ College of Foreign Studies, Liaoning University,
Shenyang 110136, China

Introduction

Fast-paced technological developments have brought about structural changes to education in different parts of the world (Çakmak, 2019). People in different sectors and occupations are now in close contact with digital technologies and information communication technology (ICT) more than ever (Derakhshan & Fathi, 2023; Ding & Hong, 2023; Fu & Wang, 2022; Guo, Wang & Ortega-Martín, 2023; Soroya & Ameen, 2020; Wang, 2023; Wang et al., 2023a, 2023b; Zhi et al., 2023). Educational centers, in particular, have eagerly shifted toward technology-integrated forms of instruction by injecting new agendas for learning (Nami & Vaezi, 2018). To benefit from this digitalized mode of education and survive its pitfalls, English as a foreign language (EFL) teachers require digital literacy (DL) and competency (Lotherton & Jenson, 2011). DL is significant for EFL educators and practitioners given its possible potentials for reducing negative feelings toward technology and augmenting their academic performances (Çakmak, 2019). When a learner is literate in the digitalized world, he/she is more likely to face positive emotions and gain achievements compared to someone, who scares technology. By definition, the concept of DL is defined as an individual's capacity to understand and practically use technologies in academia (Gilster, 1997). It is an essential skill for learners to succeed in a digitalized world (Komlayut & Srivatanakul, 2017). DL influences students' future career success in different fields, especially after the spread of the COVID-19 pandemic (Pertiwi & Siti, 2022). Previous research on DL has focused on stakeholders' perceptions of technologies and DL representations and levels (Dashtestani & Hojatpanah, 2020; Durriyah & Zuhdi, 2018; Nguyen & Habók, 2022; Son et al., 2017). However, little is written about the demands, consequences, and emotional pressures of a technology-based second language (L2) education. One of the psych-affective experiences that EFL students may go through in technology-mediated L2 instruction is technostress. It is a negative state and a disease related to ICT and one's lack of ability to face technologies (Brod, 1984). Technostress appears when the needed competencies and requirements of ICT surpass the user's competence level and the demanded resources to cope with them (Fischer & Riedl, 2017).

Research shows that students' technostress negatively affects their academic performance, satisfaction, and commitment (Kumar et al., 2013; Pan, 2022; Pan et al., 2023; Penado Abilleira et al., 2020; Raghu-Nathan et al., 2008). It changes in relation to students' gender, age, educational background, and ICT level (Ragu-Nathan et al., 2008). It has also been reported that one's DL level may affect his/her perceived technostress (Shu et al., 2011). However, this relationship requires further empirical data in L2 education to be approved. Most of the studies on technostress and DL are

in organizational contexts rather than educational ones (Joo et al., 2016). There are many academic domains affected by these constructs. A significant area in which students' DL and technostress play a part is academic productivity (AP). The term AP has been defined as a student's improved work efficiency and performance due to technologies (Tarafdar et al., 2007). It is affected by personal, contextual, and intellectual factors as well as available resources (Bibi et al., 2023; Reagan, 1986). In educational settings, prior studies indicate that students' AP is affected by ICT (Wang et al., 2020). For example, Bibi et al. (2023) argued that ICT directly influenced university students' progression and AP in Pakistan. Technostress level has also been found to negatively, and inversely correlate with students' AP (Upadhyaya & Vrinda, 2021). However, such scant studies have been carried out in the context of higher education, general education, and at university level. There is a dearth of research on the interaction among EFL students' DL, technostress, and AP. Since L2 education has its own unique features, it merits scientific attention. To cast some light on this interplay, the present study examined the predictive power of Chinese EFL students' DL in their technostress and AP. The results may enhance L2 educators' ICT knowledge and its impact on students' emotional reactions and productivity in the classroom.

Literature Review

Digital Literacy

Technically but simply, the notion of DL is defined as an individual's capability to appropriately use and assess digital resources and technologies for lifelong learning (Gilster, 1997). It also concerns technology users' mindsets in using technologies (Ferrari, 2013; Wang et al., 2023c; Wang & Hemchua, 2022). As put by Martin and Madigan (2006), DL is a modern required competency in utilizing digital tools. To expand the definition, Ng (2012) argued that DL encompasses a set of literacies related to the use and transfer of ICT. Considering EFL learners, DL is operationally defined as their competency in properly using and evaluating ICT and other tools with and a positive view of their integration in education. There are some terms similar to DL in the literature including computer literacy, digital competence, media literacy, and ICT literacy (Law et al., 2018). However, DL is a broader construct, which is a prerequisite for such synonymous terms (Ferrari, 2013). It requires one to have technological pedagogical content knowledge (TPACK) to successfully integrate technologies into L2 education process. In terms of structure, DL is multi-dimensional with 3 components known as 'media literacy', 'information and communication technology literacy', and 'information literacy' (Trilling & Fadel, 2009).

Furthermore, Jin et al. (2020) maintained that DL represents one's technological knowledge, skills, and attitudes in five areas, namely 'information and data literacy', 'communication and collaboration', 'digital content creation', 'safety', and 'problem-solving'. Behind such a multiple dimensionalization of DL there are different models. For example, Krumsvik (2008) proposed a DL model that included four layers of 'basic ICT skills', 'learning strategies', 'didactic ICT competence', and 'digital Bildung' or the intersection of other layers. Moreover, Hague and Payton (2010) stated that online safety, information search, information selection, effective communication, collaboration, socio-cultural understanding, critical evaluation, and creativity are the underlying factors of DL. In a more recent model, Fraillon et al. (2019) pinpointed that DL covers 1) one's understanding of computer use, 2) digital communication, 3) producing information, and 4) gathering information (Fig. 1).

What is common among all these models and dimensionalizations is that DL pertains to a person's ability to understand and use technologies in several forms to facilitate education and work (Pertiwi & Siti, 2022). However, its consequences for and effects on L2 psycho-affective factors have been widely overlooked in the literature. One sample psycho-affective factor is technostress, as presented below.

Technostress

The origin of technostress, as a concept, dates back to the 1980s when Brod (1984) first defined it as an adverse aspect of computer use. While technostress has been regarded as a modern disease, Clark and Kalin (1996) perceived it as an aversive psychological, behavioral, and physiological consequence of technology. Likewise, Salanova et al. (2013)

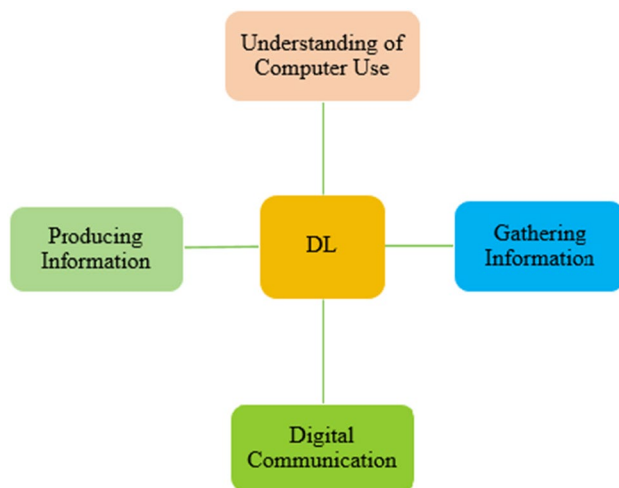


Fig. 1 Areas of Digital Literacy

described technostress as a negative psychological reaction to ICT. The term has long been confused with technophobia and computer anxiety by educators (Laspinas, 2015). For Tarafdar et al. (2007), technostress is one's lack of adaptability to technologies. Technostress serves as a double-edged sword with positive and negative consequences and effects on people depending on their mindsets and behaviors (Qi, 2019). It is the darker side of technology use (Tarafdar et al., 2007). Theoretically, technostress is supported by the job demands-resources model (JDM) and the transactional model of stress (TMS), which argue that the mismatch between organizational resources available to people and ICT demands cause technostress (Demerouti et al., 2001; Lazarus, 1966; Sun & Mei, 2022; Hu & Hemchua, 2023). There are different factors that create technostress, including techno-complexity, techno-overload, techno-insecurity, techno-invasion, and techno-uncertainty (Tarafdar et al., 2007). This negative feeling can be prevented by providing sufficient technical support and increasing users' literacy and engagement with technologies (Ragu-Nathan et al., 2008). Although research in this area is growing, the role of DL in inhibiting technostress and ultimately improving academic performance has remained unaddressed in L2 education.

Academic Productivity

The concept of AP refers to students' productivity and output as represented in their grade point average (GPA) (Hysenbegasi et al., 2005). It is the work efficiency of people during their work with digital technologies as endorsed by colleagues (Tarafdar et al., 2007). Hence, AP is not a self-perceived experience, but based on others' judgment. Additionally, AP is conceptualized as one's achievement, performance, and success in academic domains (Bibi et al., 2023). In virtual contexts, this variable may fluctuate in relation to different personal and environmental forces (Meyer & McNeal, 2011). Productivity in academia is also affected by the degree of attendance and engagement in classroom activities, as well (Khan et al., 2023). Researching this construct in L2 education is rare. That is why; the present study intended to unpack its manifestation and essence in relation to digital technologies and emotional reactions to such resources. Operationally, AP can be described as the extent to which students perform efficiently in their academic tasks and practices in light of technologies. Such productivity is not limited to exam scores, but real performances inside and outside the classroom expected of students after a course.

Related Studies

The role of technology in L2 education has recently gained increasing attention among schools highlighting its effect on teachers' and students' emotions and identities (Derakhshan

et al., 2021a, 2021b; Pertiwi & Siti, 2022; Wu et al., 2023). Moreover, the sudden shift toward online L2 instruction demanded L2 educators to form different technological competencies (Nguyen & Habók, 2022). They needed DL more than before as revealed in studies on their perceptions of using technologies (Fraillon et al., 2019). Empirical studies showed that EFL teachers and students had low DL levels (Dashtestani & Hojatpanah, 2020). As a case in point, Nguyen and Habók (2022) examined the DL of 1661 EFL students in Vietnam and reported DL levels ranging from low to average. Moreover, in their mixed-methods study, Pertiwi and Siti (2022) scrutinized Indonesian EFL students' perceptions of DL and found that the students had a positive view of technology integration into L2 learning. So far, the studies of DL in L2 contexts have centered on its conceptualization, measurement, and consequences for teaching and learning. Nevertheless, the possible effect of DL on EFL students' psycho-affective constructs has been extensively ignored. Although there are mounting studies in support of technology integration into L2 education to generate several positive outcomes (Derakhshan & Fathi, 2023; Derakhshan et al., 2021a; Derakhshan et al., 2023; Liu & Wang, 2024), the way DL may prevent EFL students' negative technology-induced emotions like technostress has been left undiscovered.

Technostress has been reported to have different causes, outcomes, and inhibitors in educational research (Wang et al., 2020). It has been found that students' technostress level affects their academic performance and learning behaviors (Penado Abilleira et al., 2020). Previous research pinpointed the impact of demographic factors and technological competency level on learners' perceived technostress (Ragu-Nathan et al., 2008). It has been claimed to negatively affect work commitment (Tarafdar & Stich, 2021), self-esteem (Korzynski et al., 2021), and well-being (Afifi et al., 2018). The literature on this construct has been limited to four lines of research including its creators, inhibitors, outcomes, and determinant demographics (Wang et al., 2020). One of the most important factors that can prevent students' technostress is DL and digital self-efficacy (Ragu-Nathan et al., 2008; Shu et al., 2011). However, little is known about such an interaction in EFL contexts. Moreover, as argued by some scholars (e.g. Dashtestani & Hojatpanah, 2020; Son et al., 2017) EFL students' DL can positively affect other aspects of their language learning. One such area is their AP, which has been found to be influenced by personal, emotional, and technological factors (Bibi et al., 2023; Khan et al., 2023). AP is also affected by students' technostress as reported by Upadhyaya and Vrinda (2021) in their study on 673 Indian students. Although the three variables of DL, technostress, and AP have separately been examined in different fields, their interaction in L2 education research is uncharted. Most of the studies on these constructs have focused on

their underlying components, measurement tools, causes, and consequences. However, there is a shortage of empirical research on whether DL has the potential to predict the other two variables. To fill this gap, this study took a qualitative approach to reveal the predictive power of EFL students' DL in their technostress and AP in the context of China. To this end, the following research question was formulated and perused.

RQ: How much variance in Chinese EFL students' technostress and academic productivity can be predicted by their digital literacy?

Method

Participants

The sample of this study was comprised of 426 EFL students China. They were studying English in from 4 universities of Liaoning Province. Both genders participated in this study with males accounting for 15.5% of the sample and females occupying 84.5% of the whole sample. The ages of the participants ranged from 20 to 28 years. Concerning their education, the participants have majored in English Translation, Literature, Language Teaching, and Business English (Table 1).

They participated in the survey voluntarily after being informed of the goal of the research.

Instruments

Digital Literacy Questionnaire (DLQ)

The researchers employed Dashtestani and Hojatpanah's (2020) questionnaire to assess Chinese EFL learners' DL.

Table 1 Demographic information of the participants

| Demographic information category | N | % |
|----------------------------------|------------|------|
| <i>Gender</i> | | |
| Male | 66 | 15.5 |
| Female | 360 | 84.5 |
| <i>Level</i> | | |
| B.A | 316 | 74.2 |
| M.A | 110 | 25.8 |
| <i>Major</i> | | |
| Translation | 140 | 32.9 |
| Literature | 60 | 14.1 |
| Language teaching | 136 | 31.9 |
| Business English | 90 | 21.1 |
| Total | 426 | |

It encompassed 41 items under four sections of 'students' frequency of the use of digital devices' (7 items), 'students' purpose of the use of digital devices' (4 items), 'students' levels of digital literacy' (15 items) and 'students' frequency of using digital applications' (15 items). A five-point Likert scale was used in this scale with different headings in line with its sub-scales. The total reliability of this questionnaire was calculated to be 0.95.

Technostress Scale

The technostress of EFL students was measured through a 23-item scale developed by Tarafdar et al. (2007). The items were presented in the 5-point Likert scale under 5 components of techno-overload (5 items), techno-invasion (4 items), techno-complexity (5 items), techno-insecurity (5 items), and techno-uncertainty (4 items). The rating ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). "I am forced by this technology to work much faster" is an item from this scale. The overall reliability of the scale was 0.92.

Academic Productivity Questionnaire (APQ)

This construct was measured via an adapted scale from Tarafdar et al. (2007). It had 4 questions on a 4-point Likert scale varying from 1 (Strongly Disagree) to 5 (Strongly Agree). "Technology helps to improve the quality of my academic work" is a sample question from this instrument. The reliability of the scale was estimated by composite reliability and the results showed a coefficient of 0.89, which is acceptable.

Data Collection Procedure

To collect the data, the researchers distributed an electronic version of the three questionnaires pertaining to DL, technostress, and AP through WeChat in China. In doing that, the QR code was given to a sample of 500 Chinese EFL students from which 426 were fully completed and submitted by the one-week time interval allowed to the respondents. Before commencing the data collection phase, the researchers ensured the reliability and validity of the scales and asked the participants to sign their formal consent for participation in the study. They were also guaranteed that their personal information and responses would remain private all the way through the study. Upon the end of the deadline, the gathered data were double-checked, sorted, and prepared for statistical analyses. The results were then visually illustrated via Tables and Figures.

Data Analysis

To answer the research question, the researchers used SPSS software (version 27) and AMOS (version 24). Through employing Structural Equation Modeling (SEM) and functions such as reliability, correlation, and Multiple Linear Regression, the obtained data were analyzed.

Results

To find the reliability of the questionnaire, their convergent and discriminant validity, and to explore the relationships among students' digital literacy, technostress, and academic productivity, the researcher conducted confirmatory factor analysis (CFA). To do this, a two-factor students' digital literacy scale (41 items), a one-factor academic productivity questionnaire (4 items), and a five-factor technostress questionnaire (23 items) were projected. The results of these analyses are presented in the following tables and Fig. 2.

The results of Table 2 reveal that the goodness of fit of the model has been met. Therefore, CMIN/DF is 3.243, PNFI=0.756, and RMSEA=0.071.

The results of Table 3 indicate that the composite reliability values for all the scales of the questionnaires met the requirement of construct reliability. Moreover, all scales presented AVE values higher than 0.50 that confirm the convergent and discriminant validity of the model. Furthermore, there was a significant, strong, positive correlation between digital literacy and academic productivity, $r(423)=0.87$, $p<0.001$. Digital literacy and technostress were found to be strongly negatively correlated, $r(423)=-0.79$, $p<0.001$. The variables academic productivity and technostress were found to be negatively correlated, $r(423)=-0.78$, $p<0.001$.

The results of testing the direct relationships in the model (Table 4) show that digital literacy has a significant positive influence on students' technostress ($\beta=0.880$, $p<0.002$). The results of testing the direct relationships in the model also indicate that digital literacy has a significant positive influence on students' academic productivity ($\beta=0.784$, $p<0.001$).

The results of Table 5 indicate that 61% of changes in students' academic productivity can be explained by their digital literacy ($\beta=0.61$, $p<0.001$). Furthermore, 77% of changes in students' technostress can be explained by their digital literacy ($\beta=0.77$, $p<0.002$).

Discussion

The present study intended to figure out the influence of EFL students' DL on their technostress and AP in China.

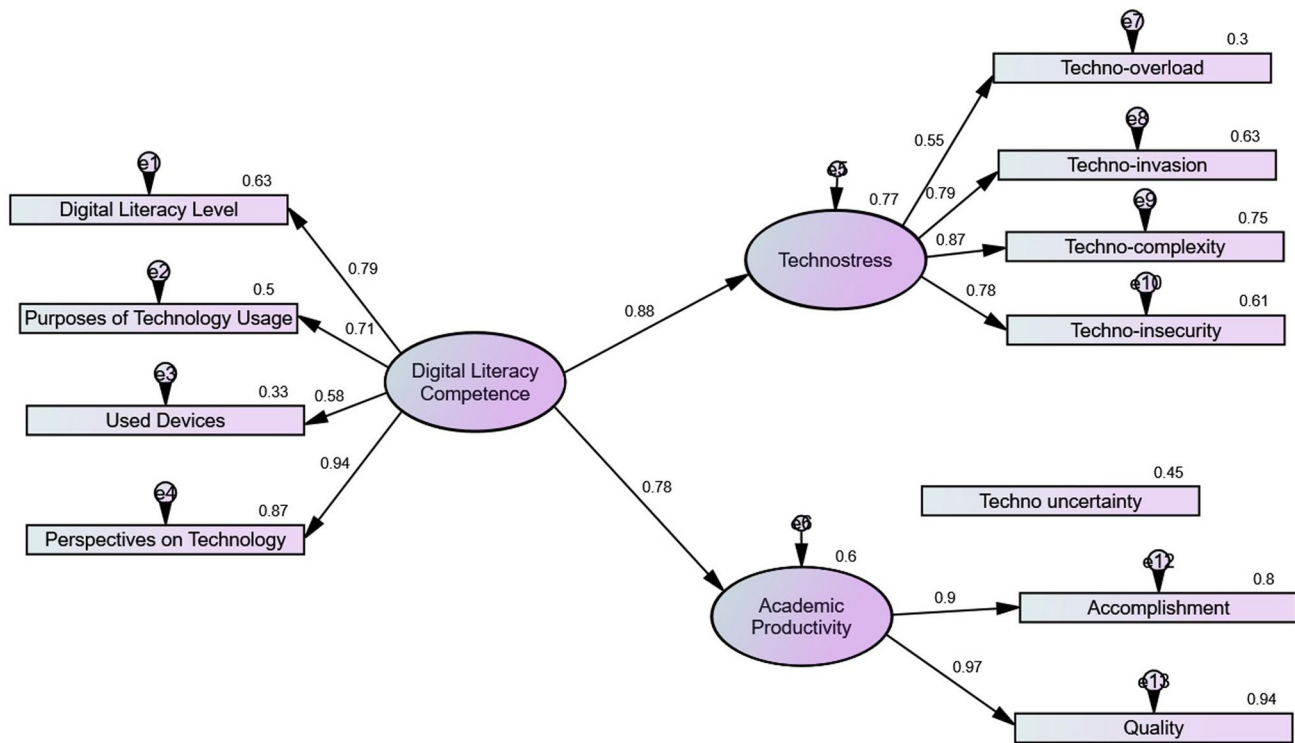


Fig. 2 The final measurement model

Table 2 CFA and goodness of Fit

| Criteria | | Threshold | | | | Evaluation |
|----------|----------|-----------|------------|-----------|--|------------|
| | | Terrible | Acceptable | Excellent | | |
| CMIN | 4293.732 | | | | | |
| DF | 1324 | | | | | |
| CMIN/DF | 3.243 | > 5 | > 3 | > 1 | | Acceptable |
| RMSEA | 0.071 | > 0.08 | < 0.08 | < 0.06 | | Acceptable |
| PNFI | 0.756 | < 0.5 | > 0.5 | | | Acceptable |

The results pinpointed that DL had a significant influence on both the technostress and AP of Chinese EFL students. Particularly, it positively correlated with AP but formed a negative relationship with technostress. The results agree with previous research (e.g. Ragu-Nathan et al., 2008; Shu et al., 2011), which emphasized the idea that DL and technological self-efficacy can minimize and prevent students’

technostress. Likewise, the results reflect that of Bibi et al. (2023), who conducted research on university students’ DL in Pakistan and argued that DL could affect the participants’ AP and progress in their studies. Furthermore, this interplay is in line with Nguyen and Habók (2022) as well as Upadhyaya and Vrinda (2021) who maintained that technostress and AP are affected by several intervening factors including technological competency and DL of the students. An explanation for such interaction among the variables in this study can be China’s ICT development and sufficient technological infrastructures. Moreover, the participants’ ICT training and education could justify the obtained results. Another logic could be a balance between ICT resources and demands in Chinese EFL contexts, making students digitally literate and efficacious. This interpretation is consistent with JDM and TMS, which posit that available ICT resources and demands influence students’ DL and technostress (Demerouti et al., 2001; Lazarus, 1966).

Table 3 Reliability and validity of the variables

| | CR | AVE | MSV | MaxR(H) | Digital literacy | Academic productivity | Technostress |
|-----------------------|------|------|-------|---------|------------------|-----------------------|--------------|
| Digital literacy | 0.88 | 0.91 | 0.955 | 0.996 | 0.954 | | |
| Academic productivity | 0.83 | 0.80 | 0.955 | 0.991 | 0.874*** | 0.894 | |
| Technostress | 0.91 | 0.85 | 0.923 | 0.981 | -0.793*** | -0.783*** | 0.921 |

*** It is significant at 0.000 level

Table 4 Standardized regression weights of the variables

| | | | Standardized Regression Weights | S.E | C.R | P |
|-----------------------|-----|-----------------------|---------------------------------|-------|-------|-------|
| Technostress | <-- | Digital Literacy | 0.880 | 0.138 | 0.417 | 0.002 |
| Academic Productivity | <-- | Digital Literacy | 0.784 | 0.493 | 0.654 | 0.001 |
| Techno-overload | <-- | Technostress | 0.755 | 0.396 | 0.673 | 0.002 |
| Techno-invasion | <-- | Technostress | 0.792 | 0.727 | 0.848 | 0.001 |
| Techno-complexity | <-- | Technostress | 0.868 | 0.812 | 0.915 | 0.001 |
| Techno-insecurity | <-- | Technostress | 0.784 | 0.689 | 0.860 | 0.001 |
| Techno-uncertainty | <-- | Technostress | 0.671 | 0.041 | 0.316 | 0.002 |
| Accomplishment | <-- | Academic Productivity | 0.912 | 0.844 | 0.938 | 0.001 |
| Quality | <-- | Academic Productivity | 0.972 | 0.928 | 1.016 | 0.001 |

Table 5 Structural model assessment

| Parameter | Estimate | Lower | Upper | <i>p</i> |
|-----------------------|----------|-------|-------|----------|
| Academic Productivity | 0.612 | 0.243 | 0.427 | 0.001 |
| Technostress | 0.773 | 0.019 | 0.174 | 0.002 |
| Quality | 0.945 | 0.861 | 1.033 | 0.001 |
| Accomplishment | 0.830 | 0.712 | 0.881 | 0.001 |
| Techno-uncertainty | 0.452 | 0.002 | 0.100 | 0.002 |
| Techno-insecurity | 0.614 | 0.474 | 0.739 | 0.001 |
| Techno-complexity | 0.753 | 0.660 | 0.838 | 0.001 |
| Techno-invasion | 0.628 | 0.529 | 0.718 | 0.001 |
| Techno-overload | 0.564 | 0.157 | 0.453 | 0.002 |

Moreover, in this research, it was found that DL could respectively predict 77% and 61% of changes in students' technostress and AP. This discovery complies with Pertiwi and Siti (2022) and Dashtestani and Hojatpanah (2022), who ran studies on learners' DL and its influences on their language learning journey. They reported that students' DL level shapes their psycho-emotional states (e.g. technostress) and academic performance and achievements. DL could predict technostress probably because they are of a similar essence and the participants may have detected their natural correlation. This reflects Tarafdar et al. (2007) and Ragu-Nathan et al. (2008), who regarded technological expertise (low and high) as the cause and cure of technostress. In online education, DL also plays a crucial role. When students' are digitally literate, they normally experience less stress and consequently gain more productivity in academia. The results can be attributed to the idea that the new generation of students are 'digital natives' and adapt to and employ technologies more easily. This is substantiated by Thompson (2013), who stated some positive correlations between the use of digital technology and the learning characteristics of digital native learners. Another explanation might be Chinese EFL teachers' and educators' high TPACK level, which had made their students feel passionate about and relaxed in the face of technologies in L2 education, as facilitators

of their academic growth rather than hurdles. In light of the results of this study, however, it is not clear whether generation differences, demographic factors, and cognitive-affective factors played a part in the purported interaction among DL, technostress, and AP or not. It is also possible that the interplay changes in other educational contexts and across disciplines and language proficiency levels.

Conclusion and Implications

Based on the results, it can be concluded that students' DL has the potential to influence of other aspects of their L2 education as well. In a digitalized world, having DL may enhance students' AP and at the same time reduce their technostress. In other words, DL can permeate into EFL students' emotional and academic world, too. Drawing on these points, this study might be helpful for EFL teachers, students, school managers, and macro-level policy-makers and decision-makers. The results of this study can be employed by EFL teachers in that they can use new teaching methodologies in line with the digitalized world so that their students feel relaxed with technologies in language education. Before integrating technologies into their classes, EFL teachers can work on students'

psycho-affective readiness and states. Doing such acts meaningfully reduces students' technostress and anxiety. Additionally, the results can help EFL students understand the importance of their DL in the productivity and emotional experiences in their language learning process. They may resort to more training programs related to educational technologies so that their DL and AP levels increase in light of less perceived technostress. Likewise, this study might be insightful for school managers, who can put more emphasis on technology integration in L2 education. They can provide teachers, learners, and staff with technological training and infrastructures in order to increase their digital competency. Finally, the results can assist policy-makers and decision-makers at the macro-level in that they can modify their plans regarding ICT integration into L2 education. When they see the penetrating role of technologies in educational growth, they may offer more budgets and infrastructure to schools. In this digital era, academic success requires support and effort from all educational parties at all levels.

It is crucial to mention that the results should be cautiously interpreted given some limitations. First, the data was only collected from one country/culture, while the variables are sensitive to cultural variation. Second, the sample was mostly composed of females (84.5%) and such a skewed distribution may affect the results. Future studies are suggested to focus on cross-cultural examinations using a balanced sample of genders. Third, the data were collected from some universities in Mainland China and the results might not echo students' perceptions in other regions. Lastly, this study only used a survey through a questionnaire, while this research tool has its own limitations. Hence, further research can be carried out using other instruments and designs. Gathering the voices of EFL teachers and students on the interplay of DL, technostress, and AP is an interesting topic for future studies. Moreover, the potentials of technologies for constructing identities and positive/negative emotions among EFL teachers and students can also be explored in the future (see Derakhshan et al., 2023; Estaji & Ghiasvand, 2023).

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Data Availability The data used to support the findings of this study are available from the corresponding author upon request.

Declarations

Conflict of interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Consent to Participate Informed consent to participate was obtained from all individual participants included in the study.

Consent for Publication Informed consent for publication was obtained from all individual participants included in the study.

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