*Romanian Journal of School Psychology*, December 2022
Vol. 15, No. 29-30, pp. 58-70

# PREDICTORS OF DIGITAL LEARNING ENGAGEMENT IN MIDDLE SCHOOL STUDENTS

Darian Faur [1] Camelia Dindelegan[2] Angelica Hălmăjan [3]

*West University of Timișoara Romania*

*University of Oradea Romania*

*University of Oradea Romania*

*Abstract*

*Technology enhanced learning (TEL) refers to the process of learning and teaching assisted by technology. Modern educational systems rely on TEL environments and recent large-scale events like the COVID-19 pandemic emphasized the need for implementing such environments. Although its utility is largely undisputed, there is a need of assessing the factors that differentiate the students' level of engagement in traditional learning and teaching systems from the TEL environments. The aim of this study was to evaluate the levels of TEL engagement in middle school students and examine the factors that might predict it, testing in the same time a mediation model that might explain the relationship between TEL engagement and the other factors. The results revealed that of the three predictors included, the only one that significantly predicted the digital learning engagement was internet skills ($\beta = .40$, $p < .001$), with the creative subcomponent of internet skills being the most strongly correlated with this type of learning engagement ($r = .49$, $p < .05$). The tested mediation model was found to be explanatory for the results, as internet skills significantly mediate the relationship between digital learning engagement and electronic devices self-efficacy and attitudes. Implications for educational system and possible explanatory psychological mechanisms are discussed.*

*Keywords: TEL engagement; middle school students; digital self-efficacy; electronic devices attitudes*

The COVID-19 pandemic brought a significant number of challenges for every part of the society. Among the most important of them, the educational field was primarily driven out of his comfort zone due to the lockdown periods and to the safety measures imposed by the governments all over the world. In this context, different studies emerged that tackled issues related to these changes, such as the implications of organizing

[1] Ph.D. Student, Doctoral School of Psychology, West University of Timișoara, Romania; E-mail: darian.faur99@e-uvt.ro

[2] Professor, Ph.D., Department of Psychology, Faculty of Social and Humanistic Studies, University of Oradea, Romania; E-mail: dindkamy@yahoo.com

[3] Lecturer, PhD, Department of Psychology, Faculty of Social and Humanistic Studies, University of Oradea, Romania; E-mail: angelica_brihan@yahoo.fr

school from home, the possible changes in students' well-being and how well can a student perform under these circumstances. With respect to these issues, Scarpellini et al. (2021) identified that, for the youngest students (primary school), the automatic processes that governed the educational activities until then were shattered in terms of routine integration and were less organized, lowering the attention functions and, as a consequence, lowering the quality of learning. They also found that some other psychological factors were involved in the process of changing from onsite school environment to online, such as increased restlessness and aggressiveness. Moreover, the context facilitated the over usage of electronic devices for entertainment and not for educational purposes.

The situations is not much different for the other educational levels, namely high school and undergraduate level. The students reported low energy levels (quite contrary to what we would've expected due to the fact that everything was remotely executed) and the presence of negative emotions, with the most frequently mentioned being anxiety, stress and depression. But that is not all – a significant percentage of the students reported that they identified the need for professional help in order to manage and regulate these emotions (Camacho-Zuñiga et al., 2021).

In this context, it is naturally to think about the factors that, if present, would eventually compensate the major deficiencies (including school performance) generated by the big changes. Regarding this issue, we know that the digital learning environment requires self-regulation and motivation in a bigger fashion in order to achieve performance. Recent findings in technologically enhanced learning environments indicated that participation was the primarily predictor of performance, followed by motivation. Moreover, situational interest (a construct which is to be differentiated from intrinsic motivation due to the fact that it is transient in nature and it is triggered by environmental cues) mediated the relationship between motivation as a general factor and performance (de Barba et al., 2016).

Related to motivation, another important factor that is of interest when discussing about online school performance is engagement in a technology enhanced learning environment. Previous studies revealed that undergraduate students use educational technology narrowly, using technological tools only in specific occasions, unless it is demanded from them to use such tools or they were presented integrally to the students before they were asked to complete an assignment (Pechenkina & Aeschliman, 2017).

The technology enhanced learning environment, or, for simplification, digital learning environment, is currently a major preoccupation within the educational research field. Since the concept of student engagement in learning was proposed, it went from a single-dimension model that explained it to a four-dimensional model that is trying

to encapsulate subfactors that explain the concept better. Regarding the engagement in digital learning environment, four dimensions can be found within the literature: behavioral engagement, cognitive engagement, emotional engagement and social engagement. Each dimension serves as an indicator of digital learning engagement (Bergdahl et al., 2020; Hu & Li, 2017).

Diving deeper into the topic, there are several factors that the literature is bringing into focus when we are talking about school motivation in a digital learning environment. One of them is the attitudinal component that a student has toward the means by which the learning environment is operating. The emerging discussions about the importance of attitudes toward electronic devices started in the last decades of the previous century, with the primarily focus on attitudes toward computer usage and what implications would negative attitudes have regarding the societal exclusion derived from those attitudes. This topic was chosen because the labor field was starting to integrate the computer work slowly, but surely, and an attitudinal component that would've been hostile to this change would've eventually had bad repercussions on a professional and educational level (Nickell & Pinto, 1986).

Nowadays, the attitudes toward electronic devices and their usage is measured not for the same reason as previously mentioned, but for more specific factors, such as online school engagement. In this regard, it appears that positive attitudes toward digital educational means (e.g. podcasts) correlate with high motivation to engage in digital learning activities (Farshi & Mohammadi, 2013).

Although is important, a positive attitude toward the usage of electronic devices is not sufficient in order to aspire for performance and motivation. The concept of self-efficacy was made popular with the formulation of social theory by Bandura, which stated that, before people decide to do something, they evaluate the resources they have in order to achieve the objective. Thus, self-efficacy is a belief in one's capacity to obtain the desired outcome (Bandurra, 1997).

Applied to our context, digital self-efficacy or electronic devices self-efficacy in students is one of the factors that the literature is bringing up in a discussion about the predictors of digital learning engagement. This subtype of self-efficacy was previously studied in relation with other variables that were of interest for the educational research field, such as academic procrastination, acceptance of technology or students' perception. Regarding the relationship between the aforementioned variable and online learning engagement, Pellas (2014) presented a positive correlation between the two. Digital learning engagement was also predicted by metacognitive self-regulation and high self-esteem in online courses.

## Method

### *Objectives*

This study's main objective was to identify the factors that better predict the middle schooler's engagement in a TEL environment. In order to do that, we collected data that measure specific psychological components related to school and to the digital context of learning.

We wanted to investigate if internet using skills, self-efficacy regarding the use of electronic devices and the attitudes that students have toward these devices predict their digital learning engagement. Lastly, we wanted to see if internet skills serve as a mediator for the predictive relationship between electronic device attitudes, self-efficacy and the engagement in a digital learning environment.

### *Participants*

Our participants for the present study were middle school students. We had a total of 190 participants, with ages between 10 and 15 years (M = 12.44). They all agreed to participate voluntarily and they were informed about their right to withdraw in any moment of the data collection procedure and that their participation was anonymously. Of the total number, 95 (50%) were feminine subjects and 95 (50%) were masculine subjects. Of these 148 (77.9%) were from the urban area and 42 (22.1%) were from the rural area. All of our participants studied at urban public schools and had no special learning conditions (*e.g.*, learning disorders, mental disabilities etc.). Concerning the year of study, 58 (30.5%) were in the 5th grade, 57 (30%) were in the 6th grade, 22 (11.6%) were in the 7th grade and 53 (27.9%) where in the 8th grade. The average grade for the last online semester was 9.5.

### *Measures and procedure*

*Demographics and time spent on the internet*. Regarding the first section of the data we collected, as we mentioned, our subjects participated anonymously, but for the research objectives we collected information regarding gender, age, area of origin, the current year of studies and we also asked them three questions regarding the daily usage of internet (hours), the perceived percentage of using digital means for educational purposes and the mean grade of the last semester in which they studied exclusively online.

*Engagement in technology enhanced learning*. This dimension was evaluated using the Student Engagement and Disengagement in Technology Enhanced Learning Questionnaire (EDTELQ), which is a questionnaire that measures different dimensions of engagement and disengagement within the context of digital learning. It was constructed by Bergdahl et al. (2020) and it has two big sections, specifically the engagement section and the disengagement section, numbering a total of 41 items that are captured

using a 6-point Likert scale. Inside each section, several factors are considered, such as the emotional, behavioral, cognitive and social components of both concepts.

The original study confirms the structural validity of the instrument, the confirmatory factor analysis revealing its 8-factor structure, 4 factors for each of the two sections (Bergdahl et al., 2020).

For the present study, the digital learning engagement served as the criterion variable. Thus, we only took the first section of the instrument, namely the engagement in technology enhanced learning section. The instrument presented a good internal consistency, Cronbach's $\alpha = .89$.

*Electronic devices self-efficacy.* In order to evaluate this type of self-efficacy we used the Computer Self-Efficacy Scale (CSE). The instrument, originally developed by Compeau & Higgins (1995), has a total of 10 items, that are scored on a 10-point Likert scale where 1 means "Not at all confident" and 10 means "Totally confident". It was designed for measuring the perceived self-efficacy towards using a computer.

The Romanian version of CSE presented a good internal consistency, Cronbach's $\alpha = .81$. Exploratory factor analysis was conducted in order to investigate the structural validity of the instrument. A unidimensional model solution was chosen after the EFA initially indicated the possible presence of a second factor, eliminated due to the low number of items included (Cazan et al., 2016).

For the present study, we made a small adaptation that replaced the "computer" concept with "electronic devices" in order to include other devices used for learning, such as smartphones, tablets or laptops. After carefully inspecting the items, we concluded that the change will not affect any psychometric measure, due to the fact that, in the original scale, no item was formulated in such manner that could potentially induce a different interpretation in the change context (e.g. no items that measure technical aspects of using the computer/electronic device were originally formulated), meaning that all items preserved their original meaning even after the change occurred. The reliability of the adapted scale for the current study proved to be even better than the previously mentioned one, with a Cronbach's $\alpha = .88$.

*Perceived internet skills*. These skills were measured using the Internet Skills Scale (ISS). The scale aims to measure skills related to internet use in the context of preexisting instruments that measure the same concept that are lacking precision (the authors point out several limitations of other instruments, such as incompleteness, over-simplification or conceptual ambiguity). The instrument has 35 items and has 4 subscales: operational, information navigation, social, creative and mobile. The items are measured on a 5-point Likert scale. The instrument presented a good internal consistency, Cronbach's $\alpha$ ranging from 0.84 to 0.91 for the 4 subscales (Van Deursenet al., 2016).

The internal consistency for the present research was similar to the one reported in the original study, with a Cronbach's α = .92.

*Electronic devices attitudes*. In order to measure the attitudes toward electronic devices we used Computer Attitudes Scale (CAS). The 20-item scale was developed in order to measure positive and negative attitudes that the respondents might have toward computers. In order to do so, it uses a 5-point Likert scale. It has two dimensions, 8 of the items measuring positive attitudes toward computers, and the rest of 12 items measuring negative attitudes toward computers. The original psychometric characteristics presented a strong internal consistency, Cronbach's α = .81 and a good correlation coefficient of the test-retest measure, r = .86 (Nickell & Pinto, 1986).

The Romanian version of the scale introduced a change in its structure, replacing the word "computer" with the word "internet". The instrument maintained a good internal consistency (Cronbach's α = .86) after eliminating items 8 and 17. The EFA revealed the presence of two factors, as the original study did, but they were redefined according to the new research aim (Cazanet al., 2016).

For the present study, we decided to go back to the original instrument and test the attitudes students have for computers, but similarly to the CSE scale, we extended the category so that other devices like smartphones or tablets may be included. Testing the reliability of the scale in this context revealed an acceptable internal consistency, Cronbach's α = .80.

***Procedure***

As soon as we received the ethical approval of the board of directors from "Emanuel" Theological Baptist Highschool, Oradea, nr. 253/09.11.2022, we proceeded in collecting the data. We did so by distributing a link that directed the participant to the *Google Forms* platform which contained our questionnaires. The participants were informed about their right to withdraw in any moment, and they were informed about the protection of the anonymity.

After the data collection was completed, we ran the statistical analysis in order to get the results. For these purposes we used SPSS v. 26.0 and Jamovi 2.3.18. Firstly, we looked at the psychometric proprieties of the scale we used in order to get a glimpse of the similarities (or possible differences) between them and the original ones. We also looked at the descriptive statistics and inspected the demographic data, inferring after that the differences between the groups regarding the criterion variable based on the demographic data we collected. After that we ran a correlational analysis, after which we regressed the digital engagement learning variable on the selected predictors. These procedures were all carried by using the

SPSS v. 26.0 software. The final part of our data analysis was carried in Jamovi 2.3.18, where we tested a mediation model.

## Results and discussion

*Demographics*

When we first looked at our data, we wanted to see if there is any sex difference with respect to the level of digital learning engagement. The descriptive statistics revealed a normal distribution of the data and the independent-samples T test we conducted provided a $t(188) = 1.41$, $p = .16$, meaning that were no significant differences between masculine and feminine subjects on the digital learning engagement dimension.

Regarding the possible differences between the classrooms, we ran a one-way ANOVA test after inspecting the normality of data distributions across the four groups. The results were statistically insignificant, $F(3, 86) = 2.44$, $p = .06$. In order to check if there is at least a tendency toward different levels of digital learning engagement between the different grades, we inspected the mean levels which indicated a slightly lower digital learning engagement in the 5th grade students, M = 83.01 compared to the 7th grade students, M = 93. As a matter of fact, students from grades 6, 7 and 8 all presented higher levels of TEL engagement (M > 90) compared to the 5th grade students. Even though the difference was not statistically significant, it appears that, for our sample, a lower level of TEL engagement was observed in students that just transitioned from primary school to middle school. In the same time, the level of TEL engagement appears to increase abruptly from the 5th grade to the 6th grade, after which the TEL engagement level remains quite steadily. Given the fact that our students were only in their first semester at the time we collected the data, it is highly probable that the habituation mechanisms through which students accommodate to the new school context (e.g., multiple teachers versus a single teacher, differences in grading system etc.) take a longer period of time to impact their engagement in the educational act.

No difference was found when comparing the levels of digital learning engagement based on the area of origin (rural or urban), $t(188) = -.77$, $p = .44$. On the other hand, when we compared the digital learning engagement based on the time spent on the internet (we had three options: less than one hour a day, 1-2 hours a day and more than 3 hours a day), after running a Kruskal-Wallis test due to the fact that our data distribution was not normal within the third group, we found an $H(2) = 21.44$, $p < .001$. The differences occurred between the group that reported a low amount of time spent on the internet on a daily basis (less than one hour) and the other two groups, respectively the one that reported a moderate amount of time, $t(137) = -4.99$, $p < .001$, and the one that reported a high amount of time, $U =$

280.5, $p < .001$. These results revealed that, in our sample, the students that spent more time on the internet were more prone to engage in digital learning environment compared to the students that spent less time on the internet.

Table 1. Bivariate correlations for digital learning engagement

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| **1. Engagement** | — | | | | | | | | |
| **2. Skills (operational)** | 0.421*** | — | | | | | | | |
| **3. Skills (navigation)** | 0.142 | 0.402*** | — | | | | | | |
| **4. Skills (social)** | 0.366*** | 0.563*** | 0.347*** | — | | | | | |
| **5. Skills (creative)** | 0.491*** | 0.574*** | 0.227** | 0.404*** | — | | | | |
| **6. Skills (mobile)** | 0.323*** | 0.593*** | 0.394*** | 0.573*** | 0.503*** | — | | | |
| **7. Internet Skills** | 0.472*** | 0.852*** | 0.664*** | 0.711*** | 0.760*** | 0.728*** | — | | |
| **8. Attitudes** | 0.325*** | 0.399*** | 0.504*** | 0.358*** | 0.255*** | 0.405*** | 0.509*** | — | |
| **9. Self-efficacy** | 0.186* | 0.413*** | 0.136 | 0.335*** | 0.286*** | 0.281*** | 0.383*** | 0.093 | — |

* p < .05, ** p < .01, *** p < .001

*Bivariate correlations*

The bivariate correlations are presented in Table 1. As expected, digital learning engagement correlated positively with almost every variable included in this study, excepting the navigational component of the ISS ($r = .14$, $p > .05$). The information navigation dimension was reversely scored,

meaning that a low score on this subscale meant a high perceived level of internet navigation skills. Given the fact that the total scores were pretty high on this dimension (M = 28.7), the subjects included in our study perceived their levels of internet information navigation considerably low.

Another interesting result was the very weak correlations between digital learning engagement and electronic devices self-efficacy ($r$ = .18, $p$ < .05).

On the other hand, the most powerful correlations observed were between digital learning engagement and the operational component of internet skills ($r$ = .42, $p$ < .001), respectively between digital learning engagement and the creative component of internet skills ($r$ = .49, $p$ < .05).

*Testing the linear regression and mediation model*

Multiple linear regression was used to test if electronic devices attitudes, electronic devices self-efficacy and internet skills significantly predicted digital learning engagement. Even though the overall regression was statistically significant ($R^2$ = .23, $F$[3, 186] = 18.83, $p$ < .001), the predictive value of the regression equation was weak, as only 23% of the total variance of the digital learning engagement was explained by the selected predictors.

Of the three predictors, the only one that significantly predicted the digital learning engagement was internet skills ($\beta$ = .40, $p$ < .001), while the other two predictors failed to do so (electronic devices self-efficacy $\beta$ = .02, $p$ = .77, electronic devices attitudes $\beta$ = .11, $p$ = .11).

When the subcomponents of the ISS were included as separate predictors, a better regression equation was obtained ($R^2$ = .32, $F$[7, 182] = 12.22, $p$ < .001). The creative dimension of internet skills significantly predicted digital learning engagement ($\beta$ = .36, $p$ < .001), alongside with the positive attitudes toward electronic devices ($\beta$ = .21, $p$ < .004). The effect size was medium for the first regression equation (Cohen's $f^2$ = .29) and large for the second (Cohen's $f^2$ = .47).

Lastly, we wanted to test if internet skills serve as a mediator for the relationship between digital learning engagement and the other predictors. The model we tested revealed a significant indirect effect from both electronic devices attitudes ($\beta$ = .19, $p$ < .001) and electronic devices self-efficacy ($\beta$ = .13, p < .001) to digital learning engagement through internet skills. Accordingly, attitudes significantly predict internet skills ($\beta$ = .47, $p$ < .001), self-efficacy significantly predicts internet skills ($\beta$ = .33, $p$ < .001) and internet skills significantly predicts digital learning engagement ($\beta$ = .40, $p$ < .001), relation that was already proved by the linear regression analysis. Figure 1 presents the mediation model.

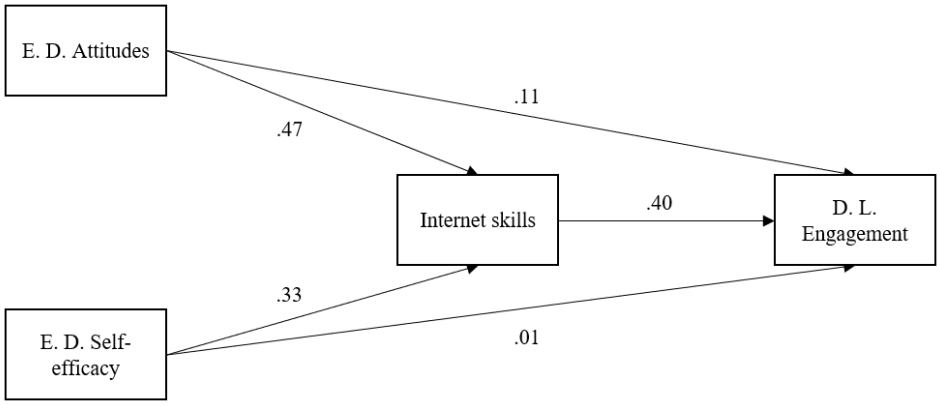


Figure 1. Mediation model for digital learning engagement

## Conclusions and limitations

The present research aimed to investigate potential predictors of technology enhanced learning engagement. The chosen predictors were electronic devices self-efficacy, attitudes toward electronic devices and internet skills. Even though the levels for the three predictors were all positively associated with TEL engagement in our sample, only internet skills significantly predicted it.

The fact that internet skills are predicting TEL engagement is consistent with prior research on the topic. In an attempt to investigate whether the situational theory of publics can explain the success or failure in the online learning environment or not, Kruger-Ross & Waters (2013) identified that students' technical abilities that help them overcome any difficulty related to the TEL environment have a significant impact over their information processing abilities, which eventually lead to a greater performance in digital learning. In the model the authors proposed, removing technological obstacles that prevent personal success in digital learning directly predicted the involvement in the virtual classroom.

The results become interesting from this point, as electronic devices self-efficacy and attitudes toward electronic devices were not significant predictors of TEL engagement. Regarding the first predictor, even though it was previously indicated that computer self-efficacy predicts the student's perceived satisfaction with e-learning (Katsarou, 2021), it appears that levels of self-efficacy regarding the usage of electronic devices don't predict the levels of TEL engagement, at least not directly. Computer self-efficacy was not considered to be a factor that might influence the intention of using e-learning systems (Hayashi et al., 2004).

In a similar fashion, attitudes toward electronic devices did not meet the sufficient requirements in order to be considered predictors of TEL engagement. In order find possible explanations for these findings, we

tested a mediation model that appeared to be relevant to the topic. We found that electronic devices self-efficacy and attitudes predict internet skills, which is a significant predictor for TEL engagement. At a first glance, this model appears to be lacking external validity, as it would be logically fallacious to assume that a change in the self-efficacy regarding the usage of electronic devices would temporally occur before a change in the levels of perceived skills to make the electronic devices usage possible. Inspecting the domains of internet skills helps us in addressing the validity issue. Testing the role of internet self-efficacy within the theoretical framework of Bandura's theory on self-efficacy, Eastin & LaRose (2000) revealed that internet self-efficacy predicts informational outcomes. A closer inspection to the way the concept was operationalized revealed that it was measured in a similar way we measured the concept of internet skills, with questions that verified the perceived capacity of the respondents to get information they trust or to find information to complete a course assignment, items that were almost identical to the ones found in the operational, navigational and even creative domains of internet skills. Thus, understanding the perception of internet skills through the outcome lens is edificatory for this matter. In other words, self-efficacy and attitudes toward electronic devices are not sufficient to predict TEL engagement, but they can serve as predictors of internet skills perception, which is in fact a positive expectancy of the internet usage outcome based on the internet skills perception that eventually predicts TEL engagement.

This study had several limitations. One of them is the relatively low number of subjects that constituted our sample. Even though our total sample had N = 190 participants, the number didn't meet the requirements recommended by Maxwell (2000), that suggested a minimum of 218 subjects for a regression equation with three predictors. Another tackles the construct validity issue and it refers to measuring the construct of electronic devices self-efficacy. Even though the authors report that no items need to be reversely scored, some items were ambiguously formulated and induced the idea of negativity or low self-efficacy (e.g. I could complete the job using the software package if someone else helped me get started). Even though this doesn't necessarily mean that the results are influenced by the ambiguity of the aforementioned items (after all, self-efficacy positively corelated with TEL engagement), it might be a source of error.

The findings of the current research indicate that TEL engagement levels might be predicted by attitudes and self-efficacy regarding electronic devices through the positive outcome perception regarding the usage of internet skills. This implies that the educational system should promote internet literacy and introduce internet skills programs in its activities in order to assure a positive perception over the internet usage, perception that would eventually predict the TEL engagement. Further research is needed in order to establish the proximal factors that emphasize these relationships.

## References

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Bergdahl, N., Nouri, J., Fors, U., & Knutsson, O. (2020). Engagement, disengagement and performance when learning with technologies in upper secondary school. *Computers & Education, 149*, 103783.

de Barba, P. G., Kennedy, G. E., & Ainley, M. D. (2016). The role of students' motivation and participation in predicting performance in a MOOC. *Journal of Computer Assisted Learning, 32*(3), 218-231.

Camacho-Zuñiga, C., Pego, L., Escamilla, J., & Hosseini, S. (2021). The impact of the COVID-19 pandemic on students' feelings at high school, undergraduate, and postgraduate levels. *Heliyon, 7*(3), e06465.

Cazan, A. M., Cocoradă, E., & Maican, C. I. (2016). Computer anxiety and attitudes towards the computer and the internet with Romanian high-school and university students. *Computers in Human Behavior, 55*, 258-267.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS quarterly*, 189-211.

Dindelegan, C. (2022). *Breviar de psihopatologie și psihologie clinică.* Institutul European.

Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer-Mediated Communication, 6*(1), JCMC611.

Farshi, N., & Mohammadi, Z. (2013). Use of podcasts in effective teaching of vocabulary: learners' attitudes, motivations and limitations. *Theory and practice in language studies, 3*(8), 1381.

Hayashi, A., Chen, C., Ryan, T., & Wu, J. (2004). The role of social presence and moderating role of computer self-efficacy in predicting the continuance usage of e-learning systems. *Journal of Information Systems Education, 15*(2), 139-154.

Hu, M., & Li, H. (2017, June). Student engagement in online learning: A review. In *2017 International Symposium on Educational Technology (ISET)* (pp. 39-43). IEEE.

Katsarou, E. (2021). The Effects of Computer Anxiety and Self-Efficacy on L2 Learners' Self-Perceived Digital Competence and Satisfaction in Higher Education. *Journal of Education and E-Learning Research, 8*(2), 158-172.

Kruger-Ross, M. J., & Waters, R. D. (2013). Predicting online learning success: Applying the situational theory of publics to the virtual classroom. *Computers & Education, 61*, 176-184.

Maxwell, S. E. (2000). Sample size and multiple regression analysis. *Psychological Methods, 5*(4), 434.

Nickell, G. S., & Pinto, J. N. (1986). The computer attitude scale. *Computers in human behavior*, *2*(4), 301-306.

Pechenkina, E., & Aeschliman, C. (2017). What do students want? Making sense of student preferences in technology-enhanced learning. *Contemporary Educational Technology, 8*(1), 26-39.

Pellas, N. (2014). The influence of computer self-efficacy, metacognitive self-regulation and self-esteem on student engagement in online learning programs: *Evidence from the virtual world of Second Life. Computers in Human Behavior*, *35*, 157-170.

Scarpellini, F., Segre, G., Cartabia, M., Zanetti, M., Campi, R., Clavenna, A., & Bonati, M. (2021). Distance learning in Italian primary and middle school children during the COVID-19 pandemic: a national survey.B*MC Public Health*, *21*(1), 1-13.

Van Deursen, A. J., Helsper, E. J., & Eynon, R. (2016). Development and validation of the Internet Skills Scale (ISS). *Information, Communication & Society*, *19*(6), 804-823.

Received
September 2022

Accepted
November 2022