

2023

## Same same but different: Learning with technology – are first-year college students prepared for this?

Birgit Schmitz

*University of Applied Management Science, Germany, birgit.schmitz@hdwm.org*

Steffen Eisenmann

*University of Applied Management Science, Germany, steffen.eisenmann@hdwm.org*

Follow this and additional works at: <https://ro.uow.edu.au/jutlp>

---

### Recommended Citation

Schmitz, B., & Eisenmann, S. (2023). Same same but different: Learning with technology – are first-year college students prepared for this?. *Journal of University Teaching & Learning Practice*, 20(4).  
<https://doi.org/10.53761/1.20.4.10>

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: [research-pubs@uow.edu.au](mailto:research-pubs@uow.edu.au)

---

## Same same but different: Learning with technology – are first-year college students prepared for this?

### Abstract

March 2020 changed the world of learning. Ever since, students have been relying on remote lecturers, virtual fellow students, and electronic learning material. For many, this greatly differs from how they used to learn before and even though technology is incremental to students' everyday life, many are not familiar with using technology for their learning. The purpose of this study was to investigate if first-year college students are prepared for learning with technology and to empirically document possible gaps. To assess this, two successive first year cohorts completed a 32-items questionnaire that was based on standardized scales to assess time management, collaboration, and self-directedness, as the three core competencies for higher education learners to successfully engage in learning with technology. The answers were related to students' prior experiences and their motivation to learn online. First results indicated that time management is a major challenge for first-year students with and without work experience. Results also suggest that the motivation to learn has a positive relationship with the concept variables chosen to assess first-year students' expectation and readiness for online learning. The findings may support the need for higher education institutions to understand students' expectations and self-assessed readiness and to identify areas for improvement.

### Practitioner Notes

1. Students will continue to rely on remote lecturers, virtual fellow students, and electronic learning material in the future. For many, this greatly differs from how they used to learn.
2. Especially first-year students need help to cope with an increasingly technology-based learning environment.
3. Time management is a major challenge for first-year students in online learning contexts.
4. The motivation to learn in online contexts has a positive relationship with the concept variables chosen to assess first-year students' expectation and readiness for online learning.
5. The findings may support the need for higher education institutions to understand students' expectations and self-assessed readiness and to identify areas for improvement.

### Keywords

online learning, higher education, first-year students. digital literacy

## Introduction

Over the past decades, higher education has continuously exploited the potential of digital technology for teaching and learning to support learners and teachers alike (Alexander et al., 2019). An extensive body of literature has now developed that looks at the motivational and interactive potential of digital technology for teaching and learning (Aristovnik et al., 2016), its chances of enhancing student learning in a self-directed and collaborative manner (Lee et al., 2014) or the impact of digital technologies on engagement factors of first-year students (Dumford & Miller, 2018). As digital technology and being online has become an incremental part of students' everyday life (Anderson & Jiang, 2018; Brodsky et al., 2021), technology-related competencies seem natural for 21<sup>st</sup> century students. However, research has long proved differently (Prensky, 2001). The COVID-19 lockdown situation has shown that aspects of digital equity and equity of access are an issue (Aristovnik et al., 2020) and that many students are not familiar with using technology for learning, especially not at a university-based curriculum as it greatly differs from how they used to learn in school (Aguilera-Hermida, 2020; Henry, 2018). This can be problematic in the transition from school to university.

To fully capitalize the potential of digital technologies for teaching and learning in higher education, and to successfully engage in learning with technology, specific personal strategies and competencies are required (Beaudoin et al., 2009; Joosten & Cusatis, 2020; Xiong et al., 2015), which many students do not necessarily possess. Students frequently lack effective self-regulated learning strategies, for example, that are important for successfully dealing with digitally supported teaching and learning opportunities (Uzir et al., 2020). In online learning, deficits of resource-related strategies such as time and study management (Holder, 2007; Liaw, 2008), lack of motivation (Chen & Jang, 2010; Park & Choi, 2009) or external factors like emotional support (Holder, 2007; Park & Choi, 2009) or technology-related competencies (Park & Choi, 2009) influence retention rates. Students need to develop such competencies and skills to learn successfully with technology, they need guidance to use technology effectively for independent learning (Lee et al., 2014) and they need to be introduced to digital tools and to processes for purposeful learning with Information and Communication Technology (ICT) (He et al., 2020; Ng, 2021; Rossing et al., 2012). First-year students' expectations and preparedness determine the transition from school to university and their first year at university (Jansen et al., 2013). However, they often cannot recognize and remedy potential deficits in learning behaviour themselves, which frequently negatively affects students' success and dropout rates that can be related to unsatisfactory study experiences; thus, problems coping with the university study demands might increase (Henry, 2018; Yorke & Longden, 2008). But even though study skill preparation and accurate expectations constitute one of the main factors determining

whether students achieved well in the first year of their studies (Jansen et al., 2013), only few studies have comprehensively investigated first-year students' expectations and competencies regarding online teaching and learning (Mah & Ifenthaler, 2018) or the influence of students' motivation to learn in online contexts. Thus, this research interest is to better understand first-year students' readiness for online learning and whether experience and motivation to learn in online contexts are significant characteristics of this readiness. The importance of which for online settings has been emphasized (Hung et al., 2010; Joosten & Cusatis, 2020). When referring to online learning, we follow the definition of Means et al., (2014, p. 6) and consider educational settings as settings, in which students follow lectures remotely and interact "with content and/or people via the internet for the purpose of learning" and where they are not required to attend a university campus (Henry, 2018).

This article is structured as follows: after the introduction, a review of literature in the field provides theoretical underpinning for the constructs relevant for our research i.e., digital competence and digital literacy, and the related concepts time management, collaborative learning, and self-directedness. The second part reports the methodology of the empirical research. Subsequently, part three provides the findings, discussion and suggestions based on the quantitative study to identify discrepancies between students' expectations and their capabilities to work in an online learning environment and to increase potential for development.

### **Literature review**

In the following, we look at existing concepts of digital literacy and digital competence that engage with the current debate and further explore current research in the field on time-management, collaborative learning, and self-directedness, which we take as the core competencies for higher education learners to successfully engage in online learning.

### ***Digital competence and digital literacy***

Digital competence and digital literacy are frequently discussed concepts. In the past decade, several frameworks have defined digital competence in an educational context. The digital competence framework (DigComp) by the European Commission, for example, describes six key areas of digital literacy (i.e., information and data literacy, communication and collaboration, digital content creation, safety and problem solving) and further details the respective competencies and related proficiency levels (Dos Santos et al., 2016). Based on this framework, tools to measure teachers' digital competence have been developed.

Still, the exact definition remains unclear (Spante et al., 2018). Recent attempts to define digital competence emphasize the confident and critical use of electronic media, and relate digital

competencies to logical thinking, critical thinking, high-level information management skills and well-developed communication skills with the aim of empowering learners (Delgado-Vázquez, 2021; Iordache et al., 2017; Levano-Francia et al., 2019). Digital literacy as a more comprehensive concept goes beyond work, and comprises all possible levels of technology use, from leisure to social and learning (Cartelli & Giovanella, 2015). However, the object and context of digital competence and digital literacy changes constantly, and a stable theoretical framework to deduce pedagogical practices is missing (Cartelli & Giovanella, 2015). For an educational context, Ng (2012) indicates a set of literacies associated with the use of digital technologies [related to] the technical, cognitive, and social-emotional perspectives of learning with technology. When exploring the use of these concepts in higher education, Spante et al., (2018) stress the transformation that has taken place. The primarily operational and technical focus on technology use has receded for a more knowledge-oriented cognitive, critical, and responsible perspective targeting social practices and proactive engagement with digital content (Spante et al., 2018).

When referring to digital competence, we refer to learning strategies for the digital era. Research has identified such strategies that are crucial for higher education learners to successfully engage in learning with technology (Beaudoin et al., 2009, Xiong et al., 2015). Such strategies comprise time management, collaborative learning, and self-directedness as the three core competencies (Xiong et al., 2015).

### ***Time management***

Time management is directed at effectively scheduling, planning, and self-managing one's study time. Strategies of time management are considered important for learning. They are an early measure of academic success (Picton et al., 2018) and significantly predict student grades (Broadbent, 2017). Even though they are positively correlated with academic outcomes (Eom and Ashill, 2016), the effectiveness of time management during online classes has seldom been researched (Broadbent, 2017; Uzir et al. 2020). Only recently has the COVID-19 lockdown led to a series of papers looking at specific aspects of time management in the context of data analytic methods, for example (Heo et al., 2021; Uzir et al., 2020). They reinforce the specific characteristics of online learning contexts which can challenge learners, i.e. "diverse and rich environments, course grades are often based on the completion of various learning activities (e.g., assessments, assignments and quizzes), each with specific time-related requirements (e.g., priorities, deadlines and timeliness)" (Uzir et al., 2020, p. 395). They point out that time management is significantly and positively related to academic performance, and Broadbent (2017), too, finds time management to be a strong predictor of subject grade and performance for online learners in higher education. Students with good time management skills can

complete tasks on time (such as weekly readings and assignments) and attend class, while still maintaining social and work activities. The research by Jansen et al., (2013) supports these findings and shows that time management is a notable determinant of whether students can complete the first-year programme and finish their studies on time.

### ***Collaborative learning***

Collaborative Learning comprises competences such as working with peers, exchanging content, or discussing and sharing ideas through synchronous or asynchronous discussion forums (Lee et al., 2014). In online learning, research on the various types of collaboration (e.g., student-content, student-student, and student-instructor collaboration) is well researched, and literature has multiple evidence that collaboration, when meaningfully integrated, can support students' learning processes and outcomes (Bernard et al., 2009; Wu et al., 2021). The theory of Online Collaborative Learning (OCL) that Harasim (2012) describes provides a "model of learning in which students are encouraged and supported to work together to create knowledge: to invent, to explore ways to innovate, and, by so doing, to seek the conceptual knowledge needed to solve problems rather than recite what they think is the right answer" (p. 90).

Recent research emphasizes the importance of opportunities to co-construct knowledge and to engage in mutual meaning-making for learning (Velamazán et al., 2021; Xiong et al., 2015). The importance of facilitating collaboration is frequently highlighted, especially for remote learning scenarios (Lawrence et al., 2021). The body of research on the interdisciplinary field of computer-supported collaborative learning (CSCL) adds the perspective of computers and designed artefacts that mediate meaning-making in mutual learning (Hakami et al., 2021; Koschmann, 2002). CSCL is related to assumptions of high learner autonomy, which again requires a certain level of readiness for CSCL (Joosten & Cusatis, 2020; Xiong et al., 2015). Even though the group skills gained while working collaboratively are crucial (Dumford & Miller, 2018), studies have reported weak correlations between student collaboration and student academic engagement (Alqurashi, 2019; Dumford & Miller, 2018; Schmitz & Hanke, 2021). Dumford and Miller (2018, p. 460), for example, suggest that "the potential isolation that comes with online, self-directed learning might contribute to fewer opportunities for collaborative learning".

Other studies unveil pitfalls such as cognitive dissonance or lower participation rates (Phielix et al., 2010) or unshared goals and communication difficulties (Xiong et al., 2015). Martin and Bolliger (2018, p. 2016) surmise that some students simply do not enjoy collaborating with peers. However, the processes and strategies which students use to recognize, control, and influence their emotions while learning together have seldom been studied (Velamazán et al.,

2021, p. 389). Xiong et al. (2015) emphasize that little research focuses on the conditions before the actual collaboration takes place, e.g., collaboration skills, attitudes towards collaboration or prior experience. They stress learner readiness, which is highly relevant to the success of collaborative settings and accent that a low level of readiness is likely to result in “non-contributing free riders that hamper productive outcomes of collaborative learning” (Xiong et al., 2015, p. 216). The set of criteria they have developed to empirically evaluate students’ readiness for CSCL comprises 39 items that include motivation and prospective behaviours for collaborative learning, as well online learning aptitude. Jansen et al. (2013) provide a scale to measure first-year student readiness by using a 36-item scale. Their readiness and expectations questionnaire (REQ) is specifically tailored to first-year students and assesses their expectations and preparedness for their first year at university.

### ***Self-directedness***

Lee et al. (2014) argue that self-directed learning can drive students' engagement in collaborative learning environments as students who are keen to fulfil their personal learning goals are eager to learn from more capable peers in online communities. There exists a large body of literature on self-directed learning (SDL) as one of the competences subsumed as 21<sup>st</sup> century skills and SDL has proven to ensure academic success (Hung et al., 2010). The need to teach competences for the 21st century as suggested by the OECD (2018) has long been indicated and it has proven valid since the COVID-19 lockdown started in March 2020.

However, to fully capitalize the potential of digital technologies for teaching and learning in higher education, the reflective and self-directed use of digital learning opportunities is of utmost importance. They play a major role, especially with increasingly digitally supported teaching and learning opportunities. Uzir et al. (2020, p. 395), for example, suggest that in blended-learning contexts, which are considered an instance of digitally supported learning offers, self-regulation mediates the relationship between learners’ time management strategies and their academic achievement, which emphasizes the fact that online learners must take some responsibility for their own learning (Yang & Cornelius, 2005).

Self-directed learning is frequently defined as “a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes” (Knowles, 1975, p. 18) and comprises planning learning goals, using appropriate learning methods or assessing learning outcomes, for example (Lee et al., 2014). Self-directedness is of particular importance in the introductory phase of studies as it helps students to select and apply learning strategies which are appropriate

to the situation, to monitor their learning behaviour and to use resources thoughtfully. For online contexts, this competence is even more important especially in relation to time management skills (Eberle & Hobrecht, 2021). Hung et al. (2010) point out the particular importance of self-directed learning competencies to meet the requirements of online learning programmes and argue the need to consider students' dispositions in online learning environments. The study by Gilbert (2007) further indicates that particularly online contexts show that the reflection on this competence supports students' learning and strengthens their abilities to learn how to learn. The research by Lee et al. (2014) corroborates this by highlighting the importance of preparing students for an online learning context as it showed that only students who have acquired the competence to learn self-directedly in face-to-face classroom environments were engaged in ICT for learning and used it productively. He concludes that teachers should support students and train the skills of SDL before bringing them to the ICT-supported learning environments.

## **Method**

### ***Research interest***

As expectations of university demands and students' preparedness represent important factors for students' success (Jansen et al., 2013), this study scrutinizes these aspects from the student perspective with an eye on online learning. Thus, this research aims at supporting students and institutions alike by focusing on:

**RI 1:** What expectations regarding online learning do first-year students have?

**RI 2:** To what degree are first-year students ready to successfully engage in online learning?

**RI 3:** How does first-year students' motivation to learn in online contexts relate to their expectations and readiness?

**RI 4:** Does experience (maturity) of college students (i.e., work experience, bachelor, master programmes) make any difference in first-year students' readiness to engage in online learning contexts?

### ***Participants***

Data were collected from first-year students at the University of Applied Management Studies in Mannheim. A total of 95 students participated in the study. Participants were recruited in three successive terms between 1 April 2021 and 10 May 2022. Data were collected from first-year students in the universities' undergraduate and postgraduate programmes.



To guarantee anonymity and confidentiality, the students office sent out the email invitations to students who were informed that participation in the study was voluntary. Three emails (invitation and two reminders, after two and three weeks respectively) were sent that provided the links to the questionnaire (available in English and German).

### ***Instruments and measures***

The survey instrument on first-year students' expectations and readiness to successfully engage in online learning was a questionnaire with 32 items. It was developed by adapting previously developed items referenced to in the literature (Hung et al., 2010; Jansen et al., 2013; Lee et al., 2014). As a mediating concept, we used students' work experience and motivation to learn in an online context.

The study comprised closed-ended response choices and asked students to rate their agreement with each statement in the questionnaire on a five-point Likert scale ranging from 1 (fully agree/always) to 5 (strongly disagree/never). We added one open text question for additional feedback.

The questionnaire included four sections: Section 1 aimed at identifying **socio-demographic information** about the respondent and comprised questions relating to student biographic information, i.e., age, programme, and professional experience. Section 2 was directed at identifying **students' expectations**, based on three aspects: time management, collaborative learning, and self-directedness. Students completed a questionnaire that was collocated specifically for this study and that adapted validated measures and scales from the survey by Lee et al. (2014) for the aspects of self-directedness and collaborative learning and three items on the aspect of time management from Jansen et al. (2013). Section 3 measured **students' motivation to learn in online contexts** (Hung et al. (2010) and section 4 focused on **students' readiness**. It assessed students' perceived preparedness regarding time management, collaborative and self-directed learning. Students' readiness to collaboratively work in groups and their time management was adapted from Jansen et al. (2013). The scale for assessing self-directed learning was adapted from Hung et al. (2010).

All chosen standardized scales were reported to have established acceptable to high levels of internal consistency reliability. The questions were translated into German and back into English again prior to the study to avoid biased questionnaire items. The English version is included in the appendix.

### Data analysis

Data was exported from the online survey software Unipark, and statistical analysis was completed through Jamovi (version 2.2.4.0). Paired differences in students' expectancies and students' readiness regarding the chosen learning strategies (time management, collaborative learning, and self-directedness) were evaluated using Wilcoxon signed rank test for comparing two paired samples. Bivariate correlational analysis was calculated to identify relationships between students' expectancies and students' readiness regarding the chosen learning strategies and their motivation to learn in online contexts. Simple regression analysis was used to identify whether student motivation to learn in online contexts predicts their readiness to learn online.

### Results

#### Descriptive Statistics

We surveyed 95 students (62 female and 33 male) between 18 and 45 years of age ( $M = 23.6$ ,  $SD = 5.28$ ). Table 1 reports the descriptive data of the study summarized. Participants self-reported the concept variables listed on the instrument.

Table 1. Median, Mode, and Inter-Quartile-Range for the concept variables of the study

	Median	Mode	IQR	Min	Max
Concept variables	N = 95				
Expectations about time management (ETM)	1.67	1.67	0.833	1.00	3.33
Expectations about collaborative learning with technology (ECL)	1.75	1.00	1.000	1.00	4.25
Expectations about self-directed learning with technology (ESDL)	1.60	1.00	1.000	1.00	4.80
Readiness – time management (RTM)	2.20	2.20	0.800	1.00	4.00
Readiness – collaborative learning (RCL)	1.83	1.17	1.083	1.00	3.50
Readiness – self-directed learning (RSDL)	1.80	1.80	0.800	1.00	4.00
Motivation to learn online (MLO)	1.50	1.00	0.750	1.00	4.75

Table 2 reports the Wilcoxon signed rank test results of students' expectation and readiness for the concept variables for the whole sample and the two subsamples. Subsequently, the relationships between the variables in the study and the motivation to learn in online contexts are reported (Table 3).

Table 2. Comparison of Wilcoxon signed rank test results of samples and subsamples' expectancies and readiness for all variables (results of RI 1 and RI 2)

	Full sample		Undergraduates		Postgraduates	
	N=95		n=72		n=23	
Paired concept variables						
Expectancy - Readiness	W	P	W	P	W	p
Time Management	1365	0.014	669	0.008	133	0.891
Collaborative Learning	2046	0.339	1251	0.159	94	0.465
Self-Directed Learning	1205	0.022	647	0.021	90	0.588

Both students' expectations for time management (ETM) and students' expectations for self-directed learning (ESDL) are higher than students' readiness for the respective variables. A Wilcoxon's signed-ranks test revealed this to be a significant difference for the two concept variables. For collaborative learning, undergraduates' expectancies and their self-reported readiness were more realistic.

The partition between undergraduate and postgraduate students showed that this effect originated solely from the undergraduate subsample of students. For the postgraduate first-year students, no significant difference for any of the concept variables showed.

Table 3. Bivariate correlational matrix for the concept variables of the study (results of RI 3)

	ETM	ECL	ESDL	RTM	RCL	RSDL
Expectations CL	0.445**	—				
Expectations SDL	0.410**	0.665**	—			
Readiness TM	0.209	0.451**	0.504**	—		
Readiness CL	0.302*	0.509**	0.468**	0.555**	—	
Readiness SDL	0.226	0.442**	0.515**	0.712**	0.389**	—

---

	<b>ETM</b>	<b>ECL</b>	<b>ESDL</b>	<b>RTM</b>	<b>RCL</b>	<b>RSDL</b>
Motivation to Learn Online	0.311*	0.599**	0.642**	0.522**	0.499**	0.620**

---

\*  $p < .01$ , \*\*  $p < .001$

A statistically significant relationship was found between the motivation to learn online and the concept variables (time management, collaborative learning, and self-directed learning). Expectations for time management and the motivation to learn showed the weakest correlation ( $r = 0.311$ ,  $p < 0.05$ ), but were still positively related.

Table 4. Comparison of group statistics (median, standard deviation and IQR) for all subgroups regarding work experience and maturity (RI 4).

Measure	Undergraduate				Postgraduate			
	Work experience		No work experience		Work experience		No work experience	
	(n = 60)		(n = 12)		(n = 18)		(n = 5)	
	Median (SD)	IQR	Median (SD)	IQR	Median (SD)	IQR	Median (SD)	IQR
ETM	1.67 (.557)	1.000	2.00 (.379)	0.000	2.00 (.616)	1.000	1.67 (.641)	0.667
ECL	2.00 (.699)	0.750	1.50 (.714)	0.938	1.75 (.941)	0.688	1.00 (.354)	0.500
ESDL	1.60 (.703)	1.000	1.70 (.476)	1.000	1.80 (.897)	0.800	1.00 (.743)	1.000
RTM	2.20 (.643)	0.800	2.10 (.652)	0.600	2.00 (.742)	0.800	2.00 (.460)	0.400
RCL	1.75 (.638)	0.875	1.33 (.629)	1.042	2.00 (.683)	0.800	1.80 (.358)	0.400
RSDL	1.80 (.618)	0.800	2.00 (.477)	0.700	2.00 (.683)	0.800	1.80 (.358)	0.400
MLO	1.50 (.530)	0.813	1.25 (.339)	0.563	1.25 (1.017)	0.250	1.00 (.354)	0.500

Median, standard deviation and IQR values for each of the variables in the two conditions (work experience and no work experience) for undergraduate (n=72) and postgraduate students (n=23) are provided in Table 4. It shows that students without prior work experience reported a more positive attitude (expectation and readiness) towards self-directed learning than mature students with work experience and that they were rather motivated to learn online. The Mann-Whitney U-test was used to verify the assumption of statistically significant differences related to work experience and maturity of students (RI 4). The results indicated no statistically significant differences for neither work experience nor programme (maturity) for any of the measures.

## Discussion

This paper extends the body of current research on the effectiveness of online learning environments in higher education. It investigated the role of the three core strategies for higher

education learners to successfully engage in online learning, i.e., time management, collaborative learning, and self-directedness (Beaudoin et al., 2009, Xiong et al., 2015) and related these strategies to students' motivation to learn in online contexts (Hung et al., 2010), prior work experiences and maturity. Our findings indicate that time management and self-directed learning need thorough consideration when designing online classes for first-year students.

#### *Dimensions of first-year students' expectations and readiness for engaging in learning with technology*

We were interested in the expectations of first-year students regarding online learning. The quantitative findings revealed a general agreement of students with the statements on expectations regarding time management, collaborative learning, and self-directed learning with technology as they were below the theoretical mean of three on the five-point Likert-type scale applied. It showed that students have high expectations regarding the use of computers for their learning and expect to use the computer for cooperating with their fellow students. Still, universities have seen high attrition rates in online classes (Coussement et al., 2020; Henry, 2018). We were interested to see, how these rates can be related to first-year students' readiness to learn in online contexts.

For students' readiness to learning online, the analysis also indicated a general agreement of students with the statements. The study sample showed the highest readiness in the dimension of collaborative learning. The lowest readiness showed in the dimensions of time management. It also showed that regarding time management and self-directed learning, students' expectations were greater than their readiness. For time management and self-directed learning, the difference is significant. This overall finding is consistent with other research on students' perceptions of self-directed learning with and without technology (Hung et al, 2010; Joosten and Cusatis, 2020; Lee et al., 2010). Wozniak (2015), too, indicates that students realize differences in the transition to online distant learning that are related to aspects of time management and self-directed learning, e.g., selecting a manageable study load.

#### *Differences in motivation to learn in online contexts and work experience*

Our study asked for first-year students' motivation to learn in online contexts, which they rated on average as good. We were interested in how this motivation to learn in online contexts relates to first-year students' expectations and readiness, and if work experience (maturity) of college students makes any difference in first-year students' expectations and readiness to engage in online learning contexts. Results revealed that the motivation to learn in online contexts is a significant characteristic of students' readiness to learn in online contexts. From the analysis, it

showed that the motivation to learn online has a strong relationship with students' expectations and their readiness to work collaboratively and to self-regulate their learning. Students who were motivated to learn online (e.g., learners who are open to new ideas, have a general motivation to learn and improve from their mistakes) did have much better understanding of the academic expectations and they were rather ready to learn in an online learning context. The research by Henry (2018) corroborates the role of motivation and internal energy for online students to successfully engage with their studies.

Work experience and maturity of college students (i.e., bachelor, master programmes) did not make any difference in first-year students' readiness to engage in online learning contexts. These findings do not cohere with previous research showing that maturity is a decisive factor for students' readiness to engage in online learning (Hung et al., 2010; Wozniak, 2015). All of which found that postgraduate students exhibited greater readiness in the dimension of self-directed learning and had a higher level of engagement in resources.

### **Implications**

To better prepare first-year learners for distance online learning, universities have established transition programmes that respond to students' needs and provide the necessary institutional support services which exceed the traditional pre-semester orientation week (Mah & Ifenthaler, 2018; Van der Meer et al., 2010; Wozniak, 2015). For online learning contexts, these programmes need adaptation, though. Several studies point out the importance of time management and self-regulatory behaviours for first-year students in online distance learning, and students expect universities to adequately help them to adapt (Joosten & Cusatis, 2020; Uzir et al., 2020; Van der Meer et al., 2010; Wozniak, 2015). The following ideas might further substantiate offers that develop academic competencies for first-year online learners.

Online self-tests, for example, offered at the beginning of study programmes can raise awareness and help to foster students' ability to self-regulate. The individual test result may lead to training material and suggestions for supplemental classes or workshops offered by universities (Mah & Ifenthaler, 2018). The training material or workshops for time management might comprise goalsetting, prioritising, or a regular study schedule to students. The results by Henry (2018) for example showed that students who struggle with prioritising allocate their resources poorly. Bergey et al. (2019) further suggest explaining cognitive learning strategies and connecting them to learning goals, e.g., generative strategies, memorising strategies, etc. for self-directed learning. The authors emphasize the importance of study strategy interventions especially for weaker students as study strategy training positively impacts study motivation and study outcomes. They better attitudes toward learning and reduce anxiety. Also, Lee et al. (2010)

suggest developing core learning strategies (time management, collaborative and self-directed learning) and suggest training students in face-to-face contexts without technology before engaging them in technology-supported learning. Their research indicates that students' non-ICT-supported collaborative, and self-directed learning are crucial to their productive use of ICT for learning.

However, even without supplemental workshops, lecturers can foster behavioural strategies in students by introducing them to practical aids such as goalsetting, prioritising, to-do lists, monthly planners, or a regular study schedule (Bergey et al., 2019). Managing workload and assignments are vital tools for self-assessment, especially for undergraduate first-year students. Picton et al. (2018) point out that students put effective time management on a par with being successful. Thus, frequent class assignments that award digital badges, for example, can support student engagement (Mah & Ifenthaler, 2018).

As digital learning contexts in higher education are likely to remain and not only because the COVID-19 lockdown has started to force them to, the gap between learners who have competences and those who do not will widen. As student populations are becoming more diverse, it becomes increasingly difficult for universities to adapt their first-year curricula or teaching practices to students' preparedness (Jansen et al., 2013). To reduce dropout rates and avoid frustration at a very early stage, students need help to cope with a progressively technology-based learning environment and to rethink the design of learning scenarios and modules especially as online learning will unerringly continue to play a major role in higher education.

### **Limitations and Future Work**

First, we are aware that the sample size is relatively small, and the sample was drawn from one university, which makes it somewhat difficult to generalize the findings. The results were therefore interpreted with caution. Further in-depth research on the individual concept variables of this study is needed to specify the strategies, e.g., different modes of study.

Second, the concept variables represent a science-based choice of existing strategies that may be subsumed for 21<sup>st</sup> century skills and computer literacy. However, other research could examine additional strategies that are not included in the survey.

Third, our data were self-assessed data. The reasons why students answered the questionnaire items the way that they did are unknown to us and were not investigated upon by qualitative measures. In the upcoming terms, students will be surveyed again after their first year at university has terminated (end of their second term). A mixed methods approach will then be



applied to further analyse students' process of learning and their readiness regarding the specific learning strategies.

### **Ethical Approval**

The study was reviewed and approved by the internal quality manager and coordinator for data security of the University of Applied Management Studies. The survey was completely anonymous.

### **Funding**

The authors received no direct funding for this research.

## References

- Aguilera-Hermida, A. P. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open, Volume 1*, 100011, <https://doi.org/10.1016/j.ijedro.2020.100011>.
- Alexander, B., Ashford-Rowe, K., Barajas-Murphy, K., Dobbin, G., Knott, J., McCormack, M., Pomerantz, J., Seilhamer, R., & Weber, N., (2019). *Educause Horizon Report: 2019 Higher Education Edition*. Louisville, Co: Educause.
- Anderson, M. & Jiang, J. (2018). Teens, Social Media, and Technology 2018. Pew Research Center. Retrieved December 28, 2021, from: <https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/>
- Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability, 12*(20), 8438. <https://doi.org/10.3390/su12208438>
- Aristovnik, A., Keržič, D., Tomaževic, N., & Umek, L. (2016). Determining Factors of Students' Perceived Usefulness of E-Learning in Higher Education. *Proceedings of the International Conference on E-Learning, Part of the Multi Conference on Computer Science, and Information Systems*, pp. 3–10. International Association for Development of the Information Society. <https://files.eric.ed.gov/fulltext/ED571462.pdf>
- Beaudoin, M., Kurtz, G., & Eden, S. (2009). Experiences and opinions of e-learners: What works, what are the challenges, and what competencies ensure successful online learning. *Interdisciplinary Journal of E-Learning and Learning Objects, 5*(1), pp. 275-289. <http://www.ijello.org/Volume5/IJELLOv5p275-289Beaudoin665.pdf>
- Bernard, R. M., Abrami, P. C., Borokhovski, E. Wade, A. A., Tamim, R. M., Surkes, M. A. & Bethel, E. C. (2009). A Meta-Analysis of Three Types of Interaction Treatments in Distance Education. *Review of Educational Research, 79*(3), pp. 1243-1289. <https://doi.org/10.3102/0034654309333844>
- Broadbent, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. *The Internet and Higher Education, 33*, pp. 24-32. <https://doi.org/10.1016/j.iheduc.2017.01.004>
- Brodsky, J. E., Lodhi, A. K., Powers, K. L., Blumberg, F. C., & Brooks, P. J. (2021). "It's just everywhere now": Middle-school and college students' mental models of the Internet. *Human Behaviour and Emerging Technologies, 3*(4), pp. 495-511. <https://doi.org/10.1002/hbe2.281>
- Chen, K. C., & Jang, S. J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behaviour, 26*(4), pp. 741-752. <https://doi.org/10.1016/j.chb.2010.01.011>
- Coussement, K., Phan, M., De Caigny, A., Benoit, D. F., & Raes, A. (2020). Predicting student dropout in subscription-based online learning environments: The beneficial impact of the logit leaf model. *Decision Support Systems, 135*, 113325. <https://doi.org/10.1016/j.dss.2020.113325>
- Delgado-Vázquez, Á. M. (2021). Teaching Digital Competence and Scholarly Communication: Ten Years Moving Researchers to Digital Scholarship at Pablo de Olavide University. In: V. Fernández-Marcial, & L. González-Solar (Eds.). *Cases on Research Support Services in Academic Libraries*, pp. 142-165.

- Dumford, A. D., & Miller, A. L. (2018). Online learning in higher education: exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education*, 30(3), pp. 452-465. <https://doi.org/10.1007/s12528-018-9179-z>
- Eberle, J., & Hobrecht, J. (2021). The lonely struggle with autonomy: A case study of first-year university students' experiences during emergency online teaching. *Computers in Human Behavior*, 121, 106804. <https://doi.org/10.1016/j.chb.2021.106804>
- Eom, S. B., & Ashill, N. (2016). The Determinants of Students' Perceived Learning Outcomes and Satisfaction in University Online Education: An Update. *Journal of Innovative Education*, 14(2), pp. 185-215. <https://doi.org/10.1111/dsji.12097>
- Gilbert, J. (2007). Catching the Knowledge Wave: Redefining knowledge for the post-industrial age. *Education Canada*, 47(3), pp. 4-8. <https://www.edcan.ca/wp-content/uploads/EdCan-2007-v47-n3-Gilbert.pdf>
- Hakami, E., Hernández-Leo, D., & Amarasinghe, I. (2021) Understanding the Well-Being Impact of a Computer-Supported Collaborative Learning Tool: The Case of PyramidApp. In: De Laet, T., Klemke, R., Alario-Hoyos, C., Hilliger, I., Ortega-Arranz, A. (eds) Technology-Enhanced Learning for a Free, Safe, and Sustainable World. EC-TEL 2021. *Lecture Notes in Computer Science, Vol 12884*, pp. 373-379.
- Harasim, L. (2012). *Learning Theory and Online Technologies*. New York/London: Routledge.
- He, T., Huang, Q., Yu, X., & Li, S. (2020). Exploring students' digital informal learning: the roles of digital competence and DTPB factors. *Behaviour & Information Technology*, pp. 1-11. <https://doi.org/10.1080/0144929X.2020.1752800>
- Henry, M. (2018). *The online student experience: An exploration of first-year university students' expectations, experiences, and outcomes of online education*. Doctoral Thesis at the Edith Cowan University, Australia.
- Heo, H., Bonk, C. J., & Doo, M. Y. (2021). Enhancing learning engagement during COVID-19 pandemic: Self-efficacy in time management, technology use, and online learning environments. *Journal of Computer Assisted Learning*. <https://doi.org/10.1111/jcal.12603>
- Holder, B. (2007). An investigation of hope, academics, environment, and motivation as predictors of persistence in higher education online programs. *The Internet and higher education*, 10(4), pp. 245-260. <https://doi.org/10.1016/j.iheduc.2007.08.002>
- Hung, M.-L.; Chou, C., Chen, C.-H., & Own, Z.-Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, 55(3), pp. 1080-1090. <https://doi.org/10.1016/j.compedu.2010.05.004>
- Iordache, C., Mariën, I., & Baelden, D. (2017). Developing digital skills and competences: A quick-scan analysis of 13 digital literacy models. *Italian Journal of Sociology of Education*, 9(1), pp. 6-30. <https://doi.org/10.14658/pupj-ijse-2017-1-2>
- Dos Santos, A, I., Punie, Y. & Muñoz J. C. (2016). Opening Education: A Support Framework for Higher Education Institutions. EUR 27938. Luxembourg (Luxembourg): *Publications Office of the European Union*; JRC101436.
- Jansen, E., André, S., & Suhre, C. (2013). Readiness and expectations questionnaire: a cross-cultural measurement instrument for first-year university students. *Educational Assessment, Evaluation and Accountability*, 25(2), pp. 115-130. <https://doi.org/10.1007/s11092-013-9161-2>

- Joosten, T. & Cusatis, R. (2020). Online Learning Readiness. *American Journal of Distance Education*, 34(3), pp. 180-193. <https://doi.org/10.1080/08923647.2020.1726167>
- Knowles, M. (1975). *Self-directed Learning: a guide for learners and teachers*. London, UK: Prentice-Hall International.
- Koschmann, T. (2002). Dewey's contribution to the foundations of CSCL research. Paper presented at the Proceedings of the Conference on Computer Support for Collaborative Learning: Foundations for a CSCL Community.
- Lawrence, L., Holstein, K., Berman, S. R., Fancsali, S., McLaren, B. M., Ritter, S., & Aleven, V. (2021) Teachers' Orchestration Needs During the Shift to Remote Learning. In: De Laet, T., Klemke, R., Alario-Hoyos, C., Hilliger, I., & Ortega-Arranz, A. (Eds): Technology-Enhanced Learning for a Free, Safe, and Sustainable World. *Lecture Notes in Computer Science*, Vol. 12884, pp. 347-351.
- Lee, K., Tsai, P.-S., Chai, C. S. & Koh, J. H. L. (2014). Students' perceptions of self-directed learning and collaborative learning with and without technology. *Journal of Computer Assisted Learning*, 30(5), pp. 425-437. <https://eric.ed.gov/?redir=http%3a%2f%2fdx.doi.org%2f10.1111%2fjcal.12055>
- Levano-Francia, L., Sanchez Diaz, S., Guillén-Aparicio, P., Tello-Cabello, S., Herrera-Paico, N., & Collantes-Inga, Z. (2019). Digital Competences and Education. *Journal of Educational Psychology-Propósitos y Representaciones*, 7(2), pp. 579-588. <http://dx.doi.org/10.20511/pyr2019.v7n2.329>
- Liaw, S. S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education*, 51(2), pp. 864-873. <https://doi.org/10.1016/j.compedu.2007.09.005>
- Mah, D. K., & Ifenthaler, D. (2018). Students' perceptions toward academic competencies: The case of German first-year students. *Issues in Educational Research*, 28(1), pp. 120-137. <https://eric.ed.gov/?redir=http%3a%2f%2fwww.iier.org.au%2fiier28%2fmah.pdf>
- Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, 22(1), pp. 205-222. <https://files.eric.ed.gov/fulltext/EJ1179659.pdf>
- Means, B., Bakia, M., & Murphy, R. (2014). *Learning online: What research tells us about whether, when and how*. Routledge.
- Ng, W. (2012). Can we teach digital natives' digital literacy? *Computers & Education*, 59(3), pp. 1065-1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
- Organisation for Economic Co-operation and Development (OECD), 2018. *The future of education and skills: Education 2030*. OECD.
- Park, J. H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Journal of Educational Technology & Society*, 12(4), pp. 207-217. <https://eric.ed.gov/?redir=http%3a%2f%2fwww.ifets.info%2fothers%2f>
- Phielix, C., Prins, F. J., & Kirschner, P. A. (2010). Awareness of group performance in a CSCL-environment: Effects of peer feedback and reflection. *Computers in Human Behavior*, 26(2), pp. 151-161. <https://doi.org/10.1016/j.chb.2009.10.011>

- Picton, C., Kahu, E. R., & Nelson, K. (2018). 'Hardworking, determined and happy': first-year students' understanding and experience of success. *Higher education research & development*, 37(6), pp. 1260-1273. <https://doi.org/10.1080/07294360.2018.1478803>
- Prensky, M. (2001), Digital Natives, Digital Immigrants Part 2: Do They Really Think Differently? *On the Horizon*, 9(6), pp. 1-6. <https://doi.org/10.1108/10748120110424843>
- Rossing, J. P., Miller, W. M., Cecil, A. K., & Stamper, S. E. (2012). iLearning: The Future of Higher Education? Student Perceptions on Learning with Mobile Tablets. *Journal of the Scholarship of Teaching and Learning*, 12(2), pp. 1-26. <https://scholarworks.iupui.edu/handle/1805/7071>
- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, 5(1), 1519143. <https://doi.org/10.1080/2331186X.2018.1519143>
- Uzir, N. A. A., Gašević, D., Jovanović, J., Matcha, W., Lim, L. A., & Fudge, A. (2020). Analytics of time management and learning strategies for effective online learning in blended environments. In: *Proceedings of the Tenth International Conference on Learning Analytics & Knowledge*, pp. 392-401. <https://doi.org/10.1145/3375462.3375493>
- Van derMeer, J., Jansen, E., & Torenbeek, M. (2010). It's almost a mindset that teachers need to change: first-year students' need to be inducted into time management. *Studies in Higher Education*, 35(7), pp. 777-791. <https://eric.ed.gov/?redir=http%3a%2f%2fwww.informaworld.com%2fopenurl%3fgenre%3daricle%26id%3ddoi%3a10.1080%2f03075070903383211>
- Velamazán, M., Santos P., & Hernández-Leo D. (2021). Awareness Tools for Monitoring Socio-emotional Regulation During Collaboration in Settings Outside School Without Teacher Supervision. In: De Laet, T., Klemke, R., Alario-Hoyos, C., Hilliger, I., Ortega-Arranz, A. (eds). *Technology-Enhanced Learning for a Free, Safe, and Sustainable World. EC-TEL 2021. Lecture Notes in Computer Science*, 12884, pp. 389-393.
- Wozniak, H. (2015). Conjecture mapping to optimize the educational design research process. *Australasian Journal of Educational Technology*, 31(5), pp. 597-612. <https://doi.org/10.14742/ajet.2505>
- Wu, Y., Nouri, J., Li, X., Weegar, R., Afzaal, M., & Zia, A. (2021). Catching Group Criteria Semantic Information When Forming Collaborative Learning Groups. In: De Laet, T., Klemke, R., Alario-Hoyos, C., Hilliger, I., Ortega-Arranz, A. (eds). *Technology-Enhanced Learning for a Free, Safe, and Sustainable World. EC-TEL 2021. Lecture Notes in Computer Science, Vol 12884*. Springer, pp. 16-27.
- Yang, Y. & Cornelius, L. F. (2005). Students' Perceptions towards the Quality of Online Education: A Qualitative Approach. Presented at Association for Educational Communications and Technology Annual Meeting 2005. Retrieved: December 1, 2021, from: <https://www.learntechlib.org/p/76937/>.
- Xiong, Y., So, H. J. & Toh, Y. (2015). Assessing learners' perceived readiness for computer-supported collaborative learning (CSCL): a study on initial development and validation. *Journal Computer in Higher Education*, 27, pp. 215–239. <https://doi.org/10.1007/s12528-015-9102-9>
- Yorke, M., & Longden, B. (2008) The first-year experience of higher education in the UK. York: Higher Education Academy. Retrieved: October 12, 2021, from: [https://www.heacademy.ac.uk/system/files/FYEFinalReport\\_1.pdf](https://www.heacademy.ac.uk/system/files/FYEFinalReport_1.pdf)

## Appendix

### Questionnaire

Expectations about time management (Jansen, André, & Suhre, 2013)		
1	ETM1	I will have to keep up with a lot of reading.
2	ETM2	I will have to work independently most of the time.
3	ETM3	I will have to plan my time to keep up with tests and assignments.
Expectations about collaborative learning with technology (Lee et al., 2014)		
4	ECL1	I expect my classmates and me to actively challenge each other's ideas on the online platforms.
5	ECL2	I expect my classmates and me to actively discuss our ideas online to come up with better ideas.
6	ECL3	I expect my classmates and me to actively communicate via online platforms (e.g., Forum, MSN, wiki) to learn new things together.
7	ECL4	I expect my classmates and me to actively work together to construct ICT-based documents (presentation slides, posters, etc.)
Expectations about self-directed learning with technology (Lee et al., 2014)		
8	ESDL1	I expect to use the computer to get ideas from different websites and people to learn more about a topic.
9	ESDL2	I expect to use the computer to organize and save the information for my learning.
10	ESDL3	I expect to use different computer programmes to work on the ideas that I have learned.
11	ESDL4	I expect to find out more information on the Internet to help me understand my lessons better
12	ESDL5	I expect to use the computer to keep track of my learning progress.
Motivation to learn in online contexts (Hung et al., 2010).		
13	MLO1	I am open to new ideas.
14	MLO2	I have motivation to learn.
15	MLO3	I improve from my mistakes.
16	MLO4	I like to share my ideas with others.
Students' readiness – time management (Jansen, André, & Suhre, 2013)		
22	RTM1	I am good at planning and organising my studies.
23	RTM2	My previous experiences prepared me well to keep up with lots of readings.
24	RTM3	Prior to coming to university/at high school, I found it easy to keep up with tasks/assignments.
25	RTM4	I am good at working independently.
26	RTM5	I have been taught how to best organize or plan my study.

---

Students' readiness – collaborative learning (Jansen, André, & Suhre, 2013)		
27	RCL1	I have been taught how to work in small groups
28	RCL2	I am good at working effectively in groups.
29	RCL3	I am confident working in small groups.
30	RCL4	Before coming to university, I worked a lot in groups.
31	RCL5	I am confident in discussing in small groups.
32	RCL6	I am confident in working with other people in a group.

---

Students' readiness – self-directed learning (Hung et al., 2010)		
17	RSDL1	I carry out my own study plan.
18	RSDL2	I seek assistance when facing learning problems.
19	RSDL3	I manage time well.
20	RSDL4	I set up my learning goals
21	RSDL5	I have higher expectations for my learning performance

---