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Comparing Students' Perception of Higher Education's Digitalization – A Longitudinal Study

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Abstract

This study aims to compare students' perceptions of the digitalization of higher education over time. We hypothesize that the perception will become more positive throughout a study program because of more exposure over time. We applied a 31-item questionnaire in a longitudinal study setting to measure the change in perception. Results indicate data protection, teaching quality, collaboration between students, and training for the digital learning platform as major areas of change in perception. Interestingly, students do not perceive a change in their study success. We conclude that data protection especially needs attention from Higher Education Institutions. Trust, which students experience in the physical space, needs to be transferred to the digital space.

Keywords: *Higher Education; Digitalization; Enablers; Barriers; Longitudinal Study*.

1. Introduction

Digital tools have transformed HEI teaching and learning (Castro, 2019). Student aid, administration, knowledge transmission, and assessment are increasingly computerized. Digital infrastructure improves learning methods, educational resource accessibility, and communication and collaboration. Higher education institutions (HEIs) face technology implementation issues. However, HEIs have struggled to digitalize due to stakeholders' varying needs (Reid, 2014). As digitalization grows in education, adoption has become a major concern, especially after the emergency remote teaching during the COVID-19 pandemic.

Students spend significant time on their studies at their Higher Education Institutions (HEI). Thus, they are heavily affected by changes in their HEI, such as digitalization. In our study, we aim to answer the following research question: To what extent do the students' perceptions of the digitalization of their HEI change during their studies?

To answer the above research question, we conducted a longitudinal study in which we surveyed the students' perceptions at two points in time. Our work contributes to research on enablers and barriers to digitalization. A lot of barriers will first be perceived when there is an absence of enablers, such as problems with the internet connection. Thus, barriers to the dearth of digital accomplishments are defined "as those few things that can hinder or stop the successful implementation" (Vogelsang, Liere-Netheler, et al., 2019, p. 4938). Generally, longitudinal studies are harder to conduct than cross-sectional studies (Li & Tucker, 2014). Thus, our study also contributes to an understanding of changes in perceptions over time. We hypothesize that the students' perceptions of their HEI's digitalization will be more positive with more experience. Thus, our study relates to studies by Venkatesh et al. (2012), in which experience moderates a user's behavioral intention and actual use behavior of an information system.

The study's theoretical foundation follows. After, we introduce the research approach and then analyze and discuss the results. Our study finishes with its implications and limitations.

2. Digitalization of Higher Education Institutions

Digital technologies help instructors improve learning resources and assess learning objectives (Vogelsang, Droit, et al., 2019). Additionally, digital approaches speed up services in HEI. Therefore, digital technologies have different effects. Student success becomes more transparent and portable between HEIs. This convergence may also boost process efficiency. Higher Education Institutions (HEIs) must prioritize efficiency and competitiveness due to increased competition (Adler & Harzing, 2017). The extensive availability of digital resources may challenge academics and administrators (Proserpio & Gioia, 2007).

Digital asset use in higher education is diverse. The past pandemic forced HEIs to use these resources (Mittal et al., 2021), which might have negatively affected students. Still, the enforced experience might have moderated the intention to use digital teaching and learning (Narayan & Naidu, 2024).

Many studies have examined learning environments (Lapitan et al., 2021), students' individual learning achievements (Janson et al., 2014), or achievements of educational systems (Ouajdouni et al., 2021). Tejedor, Cervi, Pérez-Escoda, Tusa, and Parola (2021) advise designing didactic learning aspects in addition to Gregory and Lodge's (2015) drivers and impediments. Several studies considered organizational anchoring and adoption (Porter & Graham, 2016). Interestingly, HEIs made few operational adjustments during the pandemic (Miller, 2021). HEIs usually resist change, which makes integrating digital technology into their organizations difficult (Al-Senaidi et al., 2009). Students experience digitization like customers. They are highly picky about HEIs' digitalization due to their digital upbringing (Crittenden et al., 2019). Also, digitization will affect their future careers (Friga et al., 2003).

3. Method

We used a 31-item questionnaire to examine students' perceptions of digitalization. The questionnaire sought students' perspectives on the digitization of higher education institutions. The items address nine digitalization barriers and 22 enablers. Participants rated items on a five-point Likert scale from "I completely disagree" (1) to "I strongly agree" (5) (Brink et al., 2020).

The longitudinal data was collected in a Bachelor's degree program in Media Technology at Malmö University, Sweden. The first data collection occurred during the second semester in April 2022 within the Digital Marketing (DM) course. The second data collection was conducted during the fifth semester in December 2023 within the course Introduction to Business in the Media Industry (AIM). The main author of this study is an active lecturer in this program. Thus, students were directly asked to participate in the study. Both courses have a workload of 15 ECTS and use a variety of physical and digital components such as lectures, workshops, seminars, and office hours. Coursework included individual and group projects, exams, and case studies. Students should master broad assessment and validation skills. Between the two measurement points, students studied courses on Process Management, Web Production, Organization & Leadership, and/or Electives.

The sample yielded 28 surveys completed at both measurement points, representing a response rate of roughly 40% of the whole batch of students. Most of these longitudinal participants were females (23 out of 28). The average age at the second measurement point was 23.7 years. We used descriptive statistics to analyze and calculate the differences between the measurement points (DM-AIM). We also used the MWU (Mann-Whitney U) test to compare the measurement points. The MWU test compares two sample medians to determine if they differ significantly. Its effect size quantifies the amount of differences (Pallant, 2005).

This longitudinal data was collected within a broader research project, in which roughly 400 students were surveyed (Draxler-Weber et al., 2022). Several analyses were conducted on the broader data set. Thus, even if this specific sample is small, we conclude our study's adequate validity and reliability.

4. Results

The results are represented in Table 1. We do not disclose the results of all 31 items. In 13 items, the Mean difference ($\bar{x}$ of DM - AIM) is greater than 0.2 or -0.2. Thus, we focused on these relatively high differences in Table 1. The column Statements in keywords represent the item in a short form. An item was formulated as an enabler (e) of digitalization or a barrier (b).

Table 1. Mean Values, Standard Deviation, and MWU test.

Statements in keywords	DM		AIM		DM - AIM		MWU test	
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	Sig.	R
1: digital courses offer added value (e)	2.82	1.25	3.21	1.07	-0.39	0.18	0.20	0.24
2: same quality teaching with less staff (e)	3.46	1.04	2.93	1.12	0.53	-0.08	0.09	0.32
3: worsened exchange between teachers and students (b)	4.00	1.18	3.61	1.20	0.39	-0.02	0.16	0.26
4: worsened collaboration between students (b)	4.14	1.08	3.61	1.29	0.53	-0.21	0.08	0.33
5: trust university's data handling (e)	4.25	1.04	4.04	0.92	0.21	0.12	0.20	0.24
6: teachers' access to personal data does not change usage of DLP (e)	4.36	0.73	4.07	0.81	0.29	-0.08	0.18	0.25
7: integration of additional information into content (e)	3.64	0.73	3.29	0.90	0.35	-0.17	0.17	0.26
8: adequate data protection (e)	4.11	0.88	3.39	1.10	0.72	-0.23	0.01	0.47
9: lecturers have sufficient IT skills (e)	3.32	1.28	3.00	1.19	0.32	0.09	0.34	0.18
10: DLP uses all technical possibilities (e)	3.18	1.22	2.86	1.11	0.32	0.11	0.39	0.16
11: freedom to decide upon digital learning materials (e)	3.32	0.98	3.11	1.03	0.21	-0.05	0.46	0.14
12: sufficient training for DLP usage (e)	2.54	1.35	3.07	1.27	-0.53	0.07	0.13	0.28
13: university's internal processes digitized (e)	3.86	1.01	3.64	0.91	0.22	0.10	0.31	0.19

Source: Cf. (Brink et al., 2020) for exact wordings of the items

With items 2, 4, 8, and 12, the changes in the Means are greater than 0.5 ($\bar{x}$ of DM - AIM), which indicates half a value on the Likert scale. The changes of the Means in items 2, 4, and 8 show a more negative perception at the second data measurement. Item 12 (Sufficient Training for the Digital Learning Platform (DLP) Usage) indicates an increasing positive perception. Items 4 and 8 show the biggest change in the Standard Deviation, indicating that students agree less on the second data measurement.

Item 1 is an enabler perceived better in the second data collection, indicating that students see a higher added value in digital courses. The other enablers are perceived as worse during the second data collection. Interestingly, the two barriers (items 3 and 4) were perceived less as a problem the second time.

The Mann-Whitney U test shows one significant result with item 8, which indicates that the perceptions of the two data measurements are different from each other. With the other items, we cannot confirm this hypothesis. In general, the effect size of the difference is small (around/under 0.3). With item 8, the effect size of the difference is medium.

Among the items that did not make it into Table 1 because of their small difference in the $\bar{x}$ of DM – AIM is the perception of digitalization as a harm to students' learning success. Interestingly, $\bar{x}$ is 0,07, which indicates that students' perceptions did not change with more exposure to digitalization. The Means are around the Median of the Likert scale, with 3.36 and 3.29, respectively.

5. Discussion

Our results show that adequate data protection (item 8) is paramount. The data collected by DLPs gives room for learning analytics, with a potential range of guiding students to surveilling them (Cormack, 2016). Thus, data collection becomes an issue of transparency and trust. Digitalization in HEI requires trust in infrastructure and safe platforms. Additionally, digitally competent professionals are needed to boost teaching, learning, research, and governance (Shrivastava & Shrivastava, 2022). Especially with the rise of AI, students might feel the need for even harsher data protection and limited data usage. Trust is an important educational factor and is often discussed in student-teacher relationships (Curzon-Hobson, 2002). Further, it includes different aspects such as trust in the educational setting, trust in educational governance, and generalized trust (Niedlich et al., 2021). Thus, there is a need to transfer the concept of trust from the physical classroom into online settings, e.g., by being transparent about how learning analytics will be governed in the educational setting.

Other studies found that students agreed with the high quality and effectiveness of online programs from a moderate (Tshering & Tshering, 2022) to a major degree (Abbas et al., 2022). Our results partly confirm this. In the first data collection, students were moderately persuaded that same-quality teaching with less staff (item 2) is possible (Mean of 3.46). Still, the value dropped over time (Mean of 2.93). Thus, HEIs need to implement processes to maintain quality while following the need to be more effective. Teaching quality is related to learning success (Paul et al., 2020). Even if students in our study perceive a decline in teaching quality with less staff, they do not perceive a change in their study success. This might be due to the Swedish higher education system fostering independent learning by offering broad and holistic courses.

Students perceive working with online group work as stressful. Major obstacles include concerns about scheduling, grading, group membership selection, and lack of interaction or feedback from some group members (Forman & Miller, 2023). In our study, students perceive worsened collaboration between students (item 4) as a smaller problem at the second measurement. In our courses, students could decide to work online and/or physically. We assume students chose the latter or a combination to solve group work.

Students in our study feel, over time, better prepared to use the DLP. We have not noticed an offer of additional training for the students other than practical day-to-day work with the DLP.

Thus, we relate this to our hypothesis from the introduction, which is that more experience influences the use behavior of an IT system (Venkatesh et al., 2012).

6. Conclusion & Limitations

Our longitudinal study on students' perception of the digitalization of their HEI pinpoints the need for reliable data protection measures, further indicating the need for an elevated level of transparency and trust. HEIs need to focus on quality teaching, even if digital teaching processes might offer higher efficiency. However, collaboration problems seem to improve. Still, there is a need to support the exchange with peers.

Our study was conducted during and after the COVID-19 pandemic with a small sample size, which might have biased and limited our results. Even if Sweden had a rather non-restrictive approach, much of teaching had to be changed to emergency remote teaching through enforced digitalization. The WHO declared the end of the pandemic in May 2023 (Wise, 2023). Thus, the pandemic might have influenced our first data collection in 2022. Even if many courses mixed physical and online elements even after the WHO declaration, the situation might be perceived as less stressful and more normal during the second data collection in December 2023. Still, further studies should collect more longitudinal data under normal circumstances. Also, we hypothesized about the students' actual use behavior. Further studies could connect data about use behavior from the DLP to the data of the items.

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