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Patterns of Media Usage by Higher Education Students in Germany and Ghana: A Cross-Country Analysis

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Abstract: The study compared two survey datasets from higher education students in Germany and Ghana regarding access to digital devices; perceived value of digital media, tools, and services used for learning; gap analysis of the actual and desired use of digital teaching and learning formats; and types of media usage profiles among students. The findings underscored commonalities between the two groups, revealing that students in both contexts are equipped with mobile devices, and are highly utilized for their learning. Similarly, both student groups exhibit a preference for utilizing external media, tools and services not owned nor administered by their respective universities. However, a stark contrast emerged in terms of the provision of, and expressed demand for digital teaching and learning formats, attributable to significant disparities in the underlying internet infrastructure and service provision between the two countries. The high intensity in the use of videos, social networks and messaging applications means majority of the students in both contexts were classified as entertainment users of media by means of a latent class analysis. While students in Germany showed differentiation between non-traditional and traditional students in terms of their media usage patterns, there was little differentiation among Ghanaian students. The study concludes by offering suggestions for enhancing support for non-traditional learning and improving digital education in Ghana and similar contexts.

Keywords: digital divide, digital education, Global North, Global South, media usage typology

Highlights

What is already known about this topic:

- Meaningful digital education requires a thoughtfully designed learning environment that takes students' characteristics, needs, and preferences into consideration.
- Understanding students' media usage behavior is a critical requirement for the instructional design process.

What this paper contributes:

- The study expands the scope of media usage typology research to encompass diverse country contexts, including situational factors such as the digital divide.
- Results show that mobile devices and mobile internet have traversed the digital divide and are heavily used for learning in both developed and developing country contexts.
- Notable contrasts exist regarding the express demand, and provision of, digital teaching and learning formats due to internet infrastructure disparities between the two contexts.
- Despite a comparatively higher provision of learning technologies within the German context, HE students' media usage patterns are not distinctly different from the Ghanaian students as both contexts primarily use media for entertainment purposes.

Implications for theory, practice and/or policy:

- A huge potential for expandability of digital teaching and learning formats in developing country contexts exist provided the underlying technology infrastructure is improved.
- HEIs in developing countries must aggressively explore and pursue opportunities for flexible learning formats and non-traditional learning due to its potential of widening access and participation in HE.



Introduction

Digital technologies have permeated teaching and learning practices of higher education institutions (HEIs) across the globe. Learners are now equipped with, and have more choices to use a wide range of technologies and applications for different purposes leading to the blurring of lines between media types (Dolch & Zawacki-Richter, 2018; Zawacki-Richter et al., 2015). In the classroom, technology is increasingly influencing not only what is taught, but also how it is taught (Daniel, 2015; Watters, 2017). One of the consequences of the proliferation of digital media is its affordance for self-directed learning as well as for learners to construct their personal learning networks, resulting in a shift towards learner agency (Bong & Liu, 2023).

Studies have been conducted at both global and regional levels (e.g. Bond et al., 2018; Gierdowski et al., 2020; Killen & Langer-Crame, 2020; Loglo & Zawacki-Richter, 2023; OECD, 2020) to investigate the use of digital media by students in higher education. Their findings are important and significant, as they offer guidance in understanding students' preferences and patterns in media usage, thereby facilitating effective media selection in instructional contexts (Bates, 2019; Morrison et al., 2011). Therefore, to make digital learning meaningful, the learning environment must be thoughtfully designed, taking into account access to digital resources, as well as the unique characteristics and preferences of learners to gain a better understanding of their needs, experiences, and motivation. Thus, understanding students' media usage behaviour becomes critical to providing tailored learning support, which is the critical link to providing high quality distance and digital education (see Brindley & Paul, 1996).

Typically, the Global North is characterised by advancements in learning technologies, and high skill levels in the use of digital media (Gierdowski et al., 2020; OECD, 2016; OECD, 2020). However, the COVID-19 pandemic brought to light a whole new set of challenges in the context of digital education efforts. For example, during the period of pandemic-induced emergency remote teaching (Hodges et al., 2020) in Germany, there were severe limitations in the digital education readiness of many German universities. These limitations were visible not only in the availability of digital infrastructures for online teaching, but also in student support systems, adequacy in professional development, and the lack of managerial strategies by universities (Kerres, 2020; Zawacki-Richter, 2020). Before the onset of COVID-19, a report by the Centre for European Policies Studies (CEPS) on the "Index of Readiness for Digital Lifelong Learning" ranked Germany at the bottom of a European comparison, highlighting Germany's inadequate investment in digital infrastructure, and the prevailing scepticism among its citizens toward digital technologies (CEPS, 2019). The challenges mentioned are traditionally associated with the Global South, stemming from 'wicked' economic and structural challenges that impede the upscaling of digital education (Agba, 2020; Gama et al., 2022; Guri-Rosenblit, 2014; Soko & Pete, 2020).

In light of the aforementioned situation, a cross-context comparison assumes even greater significance. The necessity for such a comparison is underscored by the fact that structural and sociocultural factors have been found to influence media usage within digital learning environments (Hedayati-Mehdiabadi & Gunawardena, 2022; Nguyen, 2015); hence, higher education media users must not be regarded as a universally homogeneous group. Although the existence of a digital divide between the Global North and Global South is evident, the specific variations in media usage among higher education students in these contexts remain unclear. Moreover, from the perspective of the Global North, Germany's challenging digital education landscape may offer valuable insights and implications for digitally constrained contexts in the Global South. Thus, this study aims to compare the media usage patterns of higher education students in Germany and Ghana to enhance the generalizability and transferability of findings and derive implications for higher education digital teaching and learning in both contexts.

The present study aims to address four research questions (RQs) as follows:

1. What are the kinds of digital devices Ghanaian HE students have access to, and how does it compare to their German counterparts?
2. Which digital media, tools and services are used for learning by German and Ghanaian HE students, and what is their perceived value for learning?
3. How does the expressed demand and supply of digital teaching and learning practices in Ghanaian HEIs compare with the German HEIs?
4. How do the digital media usage profiles among Ghanaian HE students compare with those observed among German HE students?

Literature

Digital higher education in Germany

The integration of digital media for teaching and learning purposes in German higher education has been an ongoing process facilitated by substantial federal government funding for research projects focused on digitalization. This emphasis on digital transformation in higher education is driven by the recognition of its potential to enhance pedagogical practices and equip students with the necessary skills for the digital era (Getto & Kerres, 2017; Schünemann & Budde, 2018). Unfortunately, German higher education institutions have shown a lackluster response to this governmental initiative. For instance, a survey conducted among German universities (n=116) revealed that only 1.7% of the respondents considered their level of digitalization to be advanced (Gilch et al., 2019). Furthermore, a study conducted by Bond et al. (2018) examining the digitalization strategies of 155 top-tier universities in Germany found that only four institutions had publicly available strategies. Moreover, the COVID-19 pandemic, which necessitated the sudden shift to emergency remote teaching (Hodges et al., 2020), exposed the unpreparedness of many German higher education institutions to engage in large-scale digital teaching and learning endeavours (Kerres, 2020; Zawacki-Richter, 2020).

Despite the widespread availability of digital tools among German higher education students, there exists a general deficiency in the skills and competencies required to effectively utilize these digital tools (Initiative D21, 2020; Statista, 2019). Several studies (e.g., Pensel & Hofhues, 2017; Steffens et al., 2017) have underscored the limited integration of digital media in pedagogical practices, primarily serving as supplementary learning aids for sharing materials rather than fostering substantive pedagogical transformations. This concern is exemplified by the extensive investigation conducted by Persike and Friedrich (2016), which revealed that digital media were not integrated into teaching and learning processes in 153 German higher education institutions. The predominant use of low-threshold applications such as digital texts (e-books, PDF documents; 98% of students), email (95%), presentation tools (e.g., PowerPoint, 92%), social networks (e.g., Facebook, 82%), and wikis (78%) further accentuates this trend. In light of these findings, Wekerle et al. (2020) convincingly argue that the potential of educational technology to foster high-quality learning processes among students remains largely untapped. Consequently, there is a growing emphasis on ongoing research initiatives aimed at developing digital skills and competencies and enhancing digital infrastructures (BMBF, 2016; Rampelt et al., 2019, p. 14) to yield improved outcomes in the utilization of digital tools and services.

The post-COVID-19 period brings forth a distinctive array of prospects and complexities in the realm of higher education in Germany. The impact of the COVID-19 pandemic has necessitated educational institutions to embark on innovative measures, including investments in digital infrastructure, facilitation of pedagogical support to educators for the creation of digital resources, and the introduction of novel forms of digital instruction and learning experiences previously unfamiliar to students. Drawing upon the

invaluable insights gained during the COVID-19 crisis, Zawacki-Richter (2020) anticipates a notable impetus in the advancement of digital higher education in Germany (p. 224).

Digital higher education in Ghana

Digital education has been an ongoing endeavour within Ghana's higher education sector for the past two decades, intending to enhance existing program offerings through diverse modalities, and to broaden access to higher education (Afari-Kumah & Tanye, 2009; Ministry of Education, 2015). Despite persistent structural and technological constraints, there has been a notable inclination to implement large-scale initiatives, exemplified by the establishment of the African Virtual University (AVU). Launched in 1997 as a World Bank project, the AVU aimed to facilitate the use of Open Distance and eLearning (ODEL) methodologies in African tertiary institutions and leverage modern information and communication technology (ICT) to enhance access to educational resources across the continent. However, the projected impact of this initiative has not been fully realized due to a variety of reasons ranging from financial, technical and accreditation issues (Ayeh, 2008). Another notable initiative is the Ghana-Korea Information Access Centre (IAC), established at the University of Ghana in 2012. The IAC was designed to provide advanced ICT infrastructure to support digital education and bridge the digital divide (Arko et al., 2019).

Then came the abrupt transition to digital education in light of the COVID-19 pandemic, which revealed weaknesses in the digital readiness of institutions in Ghana, and exacerbated inequalities in students' access to learning technologies (Agormedah et al., 2020; Soko & Pete, 2020). In response to tackling the access challenge, prominent Ghanaian public universities, namely the University of Ghana (UG) and Kwame Nkrumah University of Science and Technology (KNUST), launched initiatives such as One Student One Laptop, and One Needy Student per Laptop, respectively, to mitigate these challenges. Other universities (eg. University of Education, Winneba) have also established schemes to supply students with mobile devices with flexible payment terms (Adzifome & Agyei, 2023).

Mobile phones have emerged as the most prevalent device for student learning in the Ghanaian context, primarily driven by situational factors such as high internet data costs, expensive computers, and inadequate institutional internet connections (Amenyedzi & Badzongoly, 2018; Edumadze et al., 2019). Despite their widespread use among higher education students in Ghana, the pedagogical utilization of mobile devices remains limited (Adzifome & Agyei, 2023). A recent systematic review by Loglo and Zawacki-Richter (2023) on students' digital media usage in African higher education found that mobile devices are primarily used for assimilative tasks rather than promoting higher-order thinking and active learning. Social networks were a key component of the use of mobile phones for learning. Nonetheless, supportive policies for the implementation of mobile learning strategies have been severely lacking within the context (Amedeker, 2013; Bansah & Darko Agyei, 2022).

Learning Management Systems (LMS) serve as the principal digital learning environments, supporting various modalities such as campus-based, distance learning, and blended learning at both undergraduate and postgraduate levels (Agyemang & Dadzie, 2010; Ankamah, 2019; Ankamah, 2021). However, LMSs suffer from underutilization, predominantly serving as repositories for storing and accessing course materials (Asamoah, 2019; Asamoah & Oheneba-Sakyi, 2023). This observation underscores the limited digital skills among students and faculty, which pose significant challenges to the realization of digital education outcomes. Furthermore, support services are lacking, impeding students' effective utilization of electronic resources (Frimpong & Addo, 2020). Although open educational resources (OER) have been touted as a viable option for accessing quality learning materials for students in the Global South, faculty awareness of, and engagement with OER remains low (Loglo & Zawacki-Richter, 2019), and may ultimately reflect on students' adoption and utilization.

Addressing these challenges requires attention to several critical factors to increase the adoption of digital education in Ghana's higher education system (Adarkwah & Huang, 2023; Asamoah et al., 2020; Asamoah & Oheneba-Sakyi, 2023). To enhance the sustained use of digital tools beyond the COVID-19 era, efforts in prioritizing capacity building for faculty and the implementation of comprehensive support services for both faculty and students have been suggested. This entails fostering collaboration among stakeholders, including strategic partnerships with student representative councils (SRC), as proposed by Dramani et al. (2022).

Higher education students' media usage typologies

The categorization of media users into distinct types has garnered significant interest in the exploration of media usage patterns among higher education students. Brandzaeg (2010) defines a user typology as "the categorisation of users into distinct user types that describes the various ways in which individuals use different media, reflecting a varying amount of activity/content preferences, frequency of use and variety of use" (p. 941). He argued that typologies allow for the classification of media users based on their actual usage patterns rather than on demographic or contextual factors.

While the use of digital media by higher education students has become widespread, the focus on usage typologies within educational contexts gained prominence following a meta-analysis of 22 media usage typologies by Brandtzaeg (2010), which revealed a lack of attention given to media users within educational contexts. Subsequent studies have since further developed the research field of media usage typologies, emphasising various specific digital media types or channels such as Massive Open Online Courses (MOOCs), social networks, open educational resources (OER), the internet, or digital media in general. Additionally, research has explored student types including international online distance students (Breines et al., 2020), and traditional and non-traditional students (Zawacki-Richter et al., 2015).

The literature shows a growing emphasis on country contexts in media usage typologies among higher education students. These studies recognize the impact of country-specific factors on higher education students' media usage, highlighting the complex relationship between contextual factors and media use, so as to design effective digital learning environments that meet students' needs and experiences (Bong & Liu, 2023). Table 1 provides a summary of notable studies that have examined differences among higher education students, across various countries. For instance, Kennedy et al. (2010) conducted a study involving 2588 students from three Australian universities resulting in the establishment of a user typology consisting of four profiles: *power users*, *ordinary users*, *irregular users*, and *basic users*. The typology had power users on one end of the spectrum who utilized a wide range of technology frequently, whereas basic users were found at the other end of the spectrum consisting of users who exhibited infrequent technology use.

In a longitudinal study conducted among German higher education students in 2012 (N= 2,317), 2015 (N= 1,327), and 2018 (N= 1,928), four clusters of digital media users for learning was established (Dolch & Zawacki-Richter, 2018; Zawacki-Richter, 2015; Zawacki-Richter et al., 2015). The clusters included *entertainment users*, *advanced users*, *peripheral users*, and *instrumental users*. Recognizing the increasing diversity among higher education students, non-traditional students became a central focus of the Zawacki-Richter et al. (2015) study. Advanced users comprised users who frequently used a wide range of digital media, particularly for productivity purposes, whereas entertainment users used media for more hedonistic activities such as videos and social networks. Peripheral users exhibited low acceptance and infrequent use of digital media while instrumental users strategically employed digital media use for specific purposes.

With the increasing importance of social networks in higher education, two studies established typologies to describe students' attitudes toward social network usage. First, Gonzales et al. (2019)

identified three categories of social network users: *worried and anxious*, *balanced*, *motivated and committed*. These categories were based on a sample of 149 students enrolled in a Human Resource Management course at a Spanish university. The worried and anxious group acknowledged the time-wasting effects of social networks but experienced anxiety when unable to check their accounts. The balanced group held both positive and negative views on social network use, recognizing benefits such as collaboration while being mindful of privacy concerns. The motivated and committed group comprised students who expressed positive opinions about the effects derived from using social networks. Özlü and Kalyoncuoglu (2017), on the other hand, focused on the digital abilities and interactivity of 995 students in the Faculty of Economics and Administrative Sciences at a Turkish university, identifying six user profiles: *movers and shakers*, *game lovers*, *abstainers*, *followers*, *sharers*, and *socializers*. The range of users involved active users who created original content and produced multimedia content (movers and shakers) to active users who only consumed content without producing any (socializers).

Prior to the aforementioned studies, Johnson and Kulpa (2007) conducted a study involving 2000 college students in the United States, investigating internet usage and identified three clusters of users: *sociability*, *utility*, and *reciprocity*. Sociability is concerned with students' acquisition of skills that facilitate their interpersonal interactions with other students and teachers by using the internet, whereas utility, which has an instrumental orientation, focuses on students' use of the Internet to access additional learning resources to support their studies. The third category, reciprocity, takes an active involvement and cognitive stimulation dimension. In this cluster, students used the internet to develop cognitive skills such as communication, comprehension, reading, and critical thinking.

Table 1. Selected media usage typologies of higher education students from different contexts

	Authors	Country	Media	Typologies Identified
1	Kennedy et al. (2010)	Australia	Multiple digital media tools and services	<ul style="list-style-type: none"> • Power users • Ordinary users • Irregular users • Basic users
2	Dolch et al., 2021; Dolch & Zawacki-Richter, 2018; Zawacki-Richter et al., 2015	Germany	Multiple digital media tools and services	<ul style="list-style-type: none"> • Entertainment users • Peripheral users • Advanced users • Instrumental users
3	Gonzales et al. (2019)	Spain	Social Networks	<ul style="list-style-type: none"> • Worried and anxious • Balanced • Motivated and committed
4	Özlü & Kalyoncuoglu (2017)	Turkey	Social Networks	<ul style="list-style-type: none"> • Movers and shakers • Game lovers • Abstainers • Followers • Sharers • Socializers
5	Johnson & Kulpa (2007)	United States	Internet usage	<ul style="list-style-type: none"> • Sociability • Utility • Reciprocity

While these studies provide valuable insights into specific country contexts, they also enable cross-context comparisons to derive implications for digital education (Kaliisa et al., 2019). However, it is noteworthy that media usage typologies of higher education students have predominantly been examined through a Western lens, with limited attention given to students in developing countries (see Dolch et al., 2021; Gonzales et al., 2019; Zawacki-Richter et al., 2015). Breines et al. (2020) recognized this gap and highlighted its importance by indicating that "...to date much of the literature on non-use of media tends to be of privileged students at institutions in Europe and United States predominately, places with presumed ubiquitous access..." (p.7). Consequently, expanding the scope of research to encompass diverse country contexts, including situational factors such as the digital divide (Bong & Liu,

2023), is essential for a more inclusive understanding of media usage patterns among higher education students (Bennett & Maton, 2010) and their implications for global digital education.

Methodology

Research design

This study employed a quantitative research approach by comparing two datasets, in line with the study's aim of comparing the media usage patterns of HE students in Germany and Ghana. The first dataset comprises survey data from German HE students (N=1928), collected through an online questionnaire administered between October and December 2018 which was part of a longitudinal study (see Dolch et al., 2021). The second dataset involves data collected from HE students in Ghana (N=598) in a cross-sectional study between April and October 2020 (see Loglo, 2023). In both datasets, the survey questionnaire was distributed to participants through email lists of designated contact persons and the home pages of the participating higher education institutions' learning management systems (LMSs).

Survey instrument

The study utilized a questionnaire adapted from prior research (Dolch et al., 2021; Zawacki-Richter, 2015; Zawacki-Richter et al., 2015) to collect data on various aspects of digital media usage among participants. The questionnaire included variables related to access to digital media, devices, and the internet, as well as participants' attitudes towards different categories of digital media, including text media, general web tools and services, e-learning tools and services, smartphone use, and social network use for academic purposes. Participants were requested to indicate the frequency of their usage of 49 media tools and services (57 in the German survey) within their studies, utilizing a 5-point scale ranging from "several times a day" (5) to "never" (1). Digital tools that were not commonly used in Ghana were excluded (to shorten the survey (e.g., etherpads, RSS feeds). Additionally, students were asked to rate the usefulness of these media tools and services for their academic activities on a 5-point scale (5 = very useful - 1 = not useful at all). The questionnaire further inquired about the perceived importance of 10 specific digital teaching and learning formats (8 in the German study) on a 5-point scale (5 = very important - 1 = not important at all) as well as the frequency of use of these formats within their respective higher education institutions on a 5-point scale (5 = very often to 1 = not at all). The survey language was German for the survey in Germany, and English for the Ghanaian. Survey. The translation was done by the original developers of the instrument together with experts from the United States therefore no meanings were lost in translation.

Sample and study participants

The study participants are described in this section by comparing the German and Ghanaian samples. In both contexts, convenience sampling was used in recruiting study participants, hence participation was voluntary and self-recruited. From Table 2, the German sample comprised 1928 students from 42 HEIs with an average age of 25 years (SD = 6.65). The age range of the participants varied from 18 to 75 years. On average, the German students had completed five semesters of study (SD = 3.75) at the university. In contrast, the Ghanaian sample consisted of 598 students from 26 HEIs in Ghana, including 16 public universities and 10 private universities. The average age of the Ghanaian participants was also 25 years (SD = 5.72), with an age range of 18 to 49 years. They had completed an average of four semesters of study at the university (SD = 2.23).

Table 2. Demographic data of study participants

Variable	Germany	Ghana
1 Sample size (N)	1928	598
2 Average Age	25 (SD = 6.65)	25 (SD = 5.72)
3 Age range	18 – 75 years	18 – 49 years
4 Gender	Female (65%) Male (35%)	Female (38%) Male (62%)
5 Main subject area	Engineering (33%) Economics & Law (24%)	Business & Economics (31%) STEM (28%)
6 Study mode	Campus (77%), Online (3%), Blended (8%)	Campus (83.5%), Online (1%), Distance (3.9%), Part-time (11.4%)
7 Average semesters	5 (SD = 3.75)	4 (SD = 2.23)
8 Student type	Traditional (53%), Non-traditional 47(%)	Traditional (61%), Non-traditional (39%)

In the Ghanaian sample, almost 95% were made up of campus-based students. However, that comprised 11.4% students whose programmes were delivered part-time through evening, weekend or sandwich options. The German sample included students studying via campus-based (77%), online (3%), and blended (8%) modes. The percentage of female students was higher in the German sample (65%) compared to the Ghanaian group (38%). Perhaps, the reason for the relatively higher percentage of non-traditional students among the German sample (47%) compared to Ghana's 39%. While the definition of a non-traditional student is non-conclusive and may be contextual (Schuetze & Slowey, 2002; Stöter et al., 2014; Teichler & Wolter, 2004), non-traditional students as defined in the Ghanaian sample are made up of students who entered university as matured students, are 25 years and above, employed, parenting, or attending university through any of the part-time modes of study. The study sample was made up of students from various academic disciplines. Among the German students, majority were enrolled in Engineering programs (33%), followed by Economics and Law programs (24%). In the Ghanaian sample, Business Sciences & Economics programs (31%) accounted for the highest proportion, closely followed by STEM programs (28%). For detailed information on the distribution of study subjects in the German and Ghanaian samples, please refer to Appendix 1 and Appendix 2, respectively.

Data analysis

To answer the research questions, the samples from the German and Ghanaian contexts were compared using descriptive statistics. The study also adopted Grosch and Gidion's (2011) approach of computing the perceived value of media by averaging the ratings of usage frequency and usefulness of media in the context of learning (i.e., $[\text{Value}_{\text{frequency of use}} + \text{Value}_{\text{usage satisfaction}}]/2$). Additionally, the computation of the supply and demand of digital teaching and learning formats as proposed by Zawacki-Richter et al. (2015) was utilized. This computation involved calculating the difference between the mean values (MV) of students' demand and the current provisions supplied by the institutions, denoted as $\Delta MV = MV_{\text{Demand}} - MV_{\text{Supply}}$. Responses such as "I'm not familiar with that" or "I don't know," were treated as missing values during the analysis.

To establish a typology of media usage patterns among higher education students, a latent class analysis (LCA), proposed by Hagenaars & McCutcheon (2002), was conducted. LCA is a statistical method that, similar to factor analysis, provides a structure for the data. However, unlike factor analysis,

LCA involves discrete latent variables rather than continuous metric variables. The LCA was performed using Latent Gold 4.0 software, which enables the analysis of latent class models based on manifest variables with nominal, ordinal, or metric scale levels. Maximum likelihood and posterior mode methods were employed by the software to estimate the parameters of the class models. For a more detailed explanation of the process involved in establishing the typology of media usage patterns among higher education students based on the German dataset, previous works by Zawacki-Richter (2015), Zawacki-Richter et al. (2015), and Dolch et al. (2021) are recommended.

Limitations

To ensure the validity and reliability of this study, the measurement scales utilized in the German sample were exactly applied to the Ghanaian sample, given their strong correlation (see Zawacki-Richter et al., 2015). Furthermore, the survey data from Ghana underwent re-examination by the data expert who co-authored the referenced publication (ibid). However, it is essential to acknowledge certain limitations. Firstly, it should be noted that the higher education contexts of Germany and Ghana, although insightful, do not fully represent the entire Global North and Global South, respectively. It is important to highlight that the German dataset is three times larger than the dataset from Ghana. However, the findings can provide valuable insights and serve as a reference point in an international context.

Additionally, the data collection was conducted through an online questionnaire distributed via email and institutional platforms, resulting in a self-recruited sample that may be biased towards students who are more technologically experienced. Furthermore, the questionnaire relied on self-reported responses from students, which could be influenced by their memory, experiences, or perceptions.

Another important consideration is the temporal aspect of the data collection. The German data was collected before the onset of the COVID-19 pandemic, while the data from Ghana was collected during the height of the pandemic. This difference in timing could potentially impact the results and should be taken into account when interpreting the findings. Notwithstanding these limitations, the study provides valuable insights into the media usage patterns of higher education students in different contexts, contributing to our understanding of the digital divide and its implications for global digital education.

Findings and Discussions

RQ 1: Access to digital media

The data presented in Table 3 reveals that a high percentage of students in both Germany (98%) and Ghana (96%) have widespread access to smartphones. Similarly, substantial proportions of students in both contexts have access to laptops, with 95% in Germany and 85% in Ghana. These findings confirm a strong preference for mobility among students, facilitating location-independent study.

It is worth noting that “access rate” in the context of reporting the results in Table 3 includes both device ownership and device access, even if not owned by the student. Regarding hardware devices such as printers and scanners, access was higher among German students, reporting 65% and 58% respectively. However, it was interesting to observe that access to desktop computers was disproportionately higher in favour of Ghanaian students. This may be explained by the popularity of the establishment of computer laboratories in Ghanaian universities; a flagship infrastructure for symbolizing digital education in these parts of the world (Arko et al., 2019). Previous studies (Dolch & Zawacki-Richter, 2018; Zawacki-Richter et al., 2015) have established that fixed broadband internet connections are common among German higher education students. However, in the current study, only 35% of the Ghanaian sample reported having access to fixed broadband internet connections.

Furthermore, results showed great disparity in internet usage between the two groups. Ghanaian students reported an average daily internet use of 6 hours, whereas German students reported an average of 3.5 hours. As reported in the limitations, it is important to consider the difference in timing of the data collection periods. This difference in time may contribute to the variation in reported internet usage.

Table 3. Access rate of digital devices and internet

Digital Device	Access Rate (%)	
	Germany	Ghana
Smartphone with internet access	98	96
Notebook/Laptop	95	85
Desktop-PC	39	61
Mobile phone without internet access	13	59
Tablet-PC	45	50
Printer	65	49
Scanner	58	42
Wearable devices	22	40
E-Book-Reader	21	39
Internet @ home (Fixed Broadband)	n.q*	35

*n.q=not queried

RQ 2: Media, tools and services used for learning

The study measured the perceived value of media as reflected by the frequency of use and the perceived usefulness of the media for learning by university students along the lines of Grosch & Gidion (2011), and Grosch (2014); understood as a two-dimensional indicator of the quality of media use. High mean values indicate that using the tool adds value to students' learning experiences. The ranked perceived values, presented in Table 4, were used to compare the perceived values between German and Ghanaian students for the top 20 media, tools, and services in both countries. This analysis provides insights into any potential differences in how students from these two contexts perceive and engage with media for learning purposes.

Among both German and Ghanaian students, search engines, chat/instant messaging, and word-processing software emerged as the top-ranked media tools. However, German students reported relatively higher perceived values for these media tools and services, with mean values of 4.71, 4.50, and 4.32 respectively, compared to Ghana's mean values of 4.15, 4.07, and 3.88 respectively. An interesting finding was the higher perceived value of computer terminals outside campus among German students ($M=4.30$, ranked 5th), compared to the Ghanaian students ($M=3.30$, ranked 19th). This finding may perhaps be explained by the higher proportion of non-traditional students among the German sample who may find the use of computers at their workplaces or home to be more value-adding.

The university's learning management system ranked highest among both samples for internal media tools, and services. For Germany, it had a mean perceived value of 4.10, ranking 7th overall, and a mean perceived value of 3.66, ranking 8th. While this may indicate a certain level of emphasis regarding the centrality of the LMS in students' academic lives in both countries, evidence of underutilization abounds in both Germany (Pensel & Hofhues, 2017; Steffens et al., 2017) and Ghana (Adzifome & Agyei, 2023; Asamoah & Oheneba-Sakyi, 2023). Overall, the results demonstrate a consistent pattern,

indicating that the majority of media tools and services exhibit higher perceived values among students in both Germany and Ghana for external media, tools, and services, which are those not owned nor administered by their universities, compared to internal ones.

Table 4. Ranked perceived values of media, tools, and services: Germany - Ghana comparison (Top 20)

Germany				Ghana			
Rank	digital media	n	M	Rank	digital media, tools, and services	n	M
1	search engines	1,909	4.71	1	search engines	428	4.15
2	chat/instant messaging	1,885	4.50	2	chat/instant messaging	431	4.07
3	word processing software	1,832	4.32	3	word processing software	319	3.88
4	email account (external)	1,902	4.32	4	spreadsheet software	325	3.78
5	computer terminals outside campus	1,759	4.30	5	presentation software	322	3.74
6	PDF readers	1,879	4.25	6	videos (e.g. on YouTube)	424	3.71
7	learning management system (LMS)	1,688	4.10	7	email account (external)	425	3.69
8	electronic texts (e-books, PDFs)	1,880	4.00	8	learning management system (LMS)	327	3.66
9	university email account	1,910	4.00	9	electronic texts (e-books, PDFs)	413	3.60
10	printed texts	1,887	3.87	10	social networks	419	3.55
11	mailing lists for courses	1,766	3.77	11	printed texts	438	3.55
12	spreadsheet software	1,782	3.75	12	file storage/sharing (internal)	322	3.49
13	presentation software	1,782	3.74	13	file storage/file sharing (external)	321	3.44
14	videos (e.g. on YouTube)	1,877	3.63	14	lecture recordings	317	3.42
15	online library services	1,742	3.54	15	computer terminals on campus	320	3.36
16	online translator	1,841	3.40	16	mailing lists for courses	302	3.34
17	wikis	1,634	3.33	17	presentation-Sharing (e. g. Slideshare)	413	3.31
18	social networks	1,869	3.28	18	online library services	319	3.30
19	file storage/file sharing (external)	1,659	3.28	19	computer terminals outside campus	321	3.30
20	music (e.g. iTunes)	1,799	3.26	20	forums/newsgroups (internal)	319	3.26

Use of mobile phones for learning

The present study also examined the usage of mobile phones for studying purposes among students considering their extensive access to these devices. The top 15 ranked uses of mobile phones among students in Germany and Ghana are compared in Table 5. In both contexts, students primarily used their mobile phones for instant messaging, and internet searches outside class hours. Differences were observed in the rankings for certain uses of mobile phones between the Ghanaian and German students. For example, accessing social networks ranked 4th for Ghanaian students and 11th for German students. Similarly, collecting data for assignments ranked 5th for Ghanaian students but 15th for German students. However, a reverse pattern was observed in the usage of mobile phones to access the university's learning platform, with Germany ranking 4th and Ghana ranking 10th. These findings highlight interesting distinct patterns in how students from the two contexts utilize their mobile phones for studying purposes. The use of WhatsApp to support higher education teaching and learning has been an ongoing process in developing country contexts (Loglo & Zawacki-Richter, 2023; Madge et al., 2019). Social networks such as Facebook and YouTube have proven to be an easy way to deliver content for students' access usually through their mobile phone (OECD, 2020). These could be used to support the institutions learning management systems.

Table 5. Use of mobile phones for studies (multiple responses possible): Germany - Ghana comparison (Top 15)

Ghana			Germany		
Rank	mobile phone activity	(%)	Rank	mobile phone activity	(%)
1	instant messaging	79	1	instant messaging	88
2	Searching the internet outside classes	74	2	Searching the internet outside classes	86
3	Doing research for assignments, presentations etc.	74	3	Taking photographs of course materials	78
4	Accessing social media networks	72	4	Accessing the university's learning platform	78
5	Collecting data for assignments,	69	5	Searching the internet during classes	74
6	Taking photographs of course materials	68	6	Sending e-mails to lecturers	74
7	Searching the internet during classes	66	7	Phone calls	74
8	Posting texts or pictures	66	8	Sending e-mails to students	73
9	Composing/typing texts for assignments, etc	66	9	Doing research for assignments, presentations etc.	69
10	Accessing the university's learning platform	66	10	Checking course grades	69
11	Checking course grades	65	11	Accessing social media networks	66
12	Sending emails to lecturers	65	12	Choosing and registering courses	57
13	Communicating via the LMS	65	13	Library services	53
14	Library services	64	14	Listening to music while studying	49
15	Sending e-mails to students	64	15	Collecting data for assignments	48

RQ 3: Demand and supply of digital teaching and learning formats

Students were required to indicate the provision of (supply), and the importance of (demand) the use of certain digital teaching and learning formats in their universities. Using z-standardised values, the difference between the mean values (ΔMV) of supply and demand of digital teaching and learning practices provides a basis for determining the students' expressed need regarding the use of a particular digital teaching and learning format. While a positive value is an indication of an unmet need, a negative value indicates that the need for the digital teaching and learning format had been met or exceeded.

Table 6. Demand and supply of digital teaching and learning formats – Germany sample (z-standardised values)

Digital teaching and learning format	n	ΔMV	SD
web-based trainings	1,302	0.19	0.88
online exams and exercises	1,499	0.13	0.84
lectures as podcasts or vodcasts	1,396	0.11	0.90
virtual seminars and tutorials	1,432	-0.01	0.85
e-portfolios / learning logs	1,159	-0.04	0.83
interactive multimedia-based study	1,512	-0.05	0.84
virtual internships and labs	1,182	-0.11	0.80
materials accompanying courses	1,675	-0.51	0.56

As seen in Table 6, the demand for the majority of the digital teaching and learning formats has been met in the German context. The need for web-based training, online exams and exercises, and lectures as podcasts are significantly catered for but remain fully unmet. In the Ghanaian survey, two additional digital teaching and learning formats - audience response systems, and collaborative online tools – were

included. However, none of the demands by the students regarding digital teaching and learning formats were met. The highest demands were observed for virtual internships and labs, audience response systems, virtual seminars and tutorials, and lectures as podcasts. This means that while Ghanaian students consider these digital teaching and learning formats very important for their studies, their use in the universities was virtually absent.

Table 7. Demand and supply of digital teaching and learning formats – Ghana sample (z-standardised values)

Digital teaching and learning format	n	ΔMV	SD
virtual internships and labs	229	0.68	1.43
audience response systems	230	0.67	1.21
virtual seminars and tutorials	233	0.65	1.42
lectures as podcast/vodcast	230	0.63	1.54
interactive multimedia-based study	245	0.54	1.33
e-portfolios	210	0.48	1.31
collaborative online tools	244	0.39	1.33
online tests and assessments	245	0.38	1.33
material accompanying courses	251	0.35	1.20
web-based trainings	243	0.33	1.42

These results revealed a clear and significant disparity between the demand and supply of digital teaching and learning formats within the universities of both contexts. While higher education institutions in Germany have largely met students' demands, Ghana faces challenges in meeting students expressed demands for digital teaching and learning modalities. However, despite the relatively high provision of digital teaching and learning formats in Germany, their pedagogical utilization and the digital skills of teachers and students have been a subject of concern (Gilch et al., 2019; Wekerle et al., 2020). This concern drives home the point that the almost universal provision of digital technologies may not necessarily lead to its appropriate utilization.

In the study by Zawacki-Richter et al. (2015) and Dolch & Zawacki-Richter (2018), non-traditional students (NTS) in German higher education were found to have a significantly expressed higher demand for digital teaching and learning approaches than traditional students (TS). In order to compare with the Ghanaian situation, we conducted an independent t-test to determine any possible differences between TS and NTS in Ghana, in terms of their express demand for digital teaching and learning formats as shown in the Appendix 3. The results show that no significant differences were observed between TS and NTS.

RQ 4: Media usage profile types identified among higher education students: Germany vs. Ghana

Based on Hagedaars & McCutcheon's (2002) latent class analysis (LCA), Zawacki-Richter et al. (2015) established a media usage typology of German higher education students. The LCA utilized four scales namely, use of e-learning tools (e.g. virtual seminars), recreational use of the Internet (e.g. music download/streaming), acceptance of office software and use of social networks for learning (e.g. forming study groups) (Zawacki-Richter et al., 2015, pp. 146). From the analysis, four distinct media users were identified and labelled as *entertainment users*, *peripheral users*, *advanced users*, and *instrumental users*. The present study adopted the same scales to analyse the types of media users among students in Ghana's higher education. For each student, the individual probability of belonging to one of the types (classes) is calculated. The mean class probability is the mean value over these probability values.

Table 8. *Distribution of media usage types of higher education students in Germany and Ghana*

Media usage type	Germany (%)	Ghana (%)
Entertainment users	48	53
Advanced users	36	40
Peripheral users	11	6
Instrumental users	5	1

Table 8 displays the proportion of students assigned to one of the four media usage types between the German sample and the Ghanaian sample. The assignment to the user type is based on the modal values of the mean class probabilities. Majority of students in both contexts (Germany = 48%, Ghana = 53%) are thus classified as entertainment users, defined by a high propensity for intense use of the internet for leisure-oriented activities including streaming videos, internet searches, and being active on social networks. This was followed by advanced users who constituted 36% and 40% for the German and Ghanaian samples respectively. Advanced users may be described as having the highest preference for and use of e-learning tools, productivity and creativity tools, as well as high acceptance for leisure-oriented use of media such as social networks. Peripheral users comprised 11% and 6% for German students and Ghanaian students respectively. Peripheral users are defined by their lowest acceptance of all media tools and services compared with the other user types. Lastly, the usage typology with the least proportion was instrumental users. They accounted for only 5% and 1% of the samples in Germany and Ghana respectively. These users are defined by their comparatively higher preference and use of productivity tools including office software than all other user types, and less use of media for leisure and recreational activities. Instrumental users tend to use media in a utility-oriented way.

Further analysis employing an independent t-test to compare several sub-groups according to the four media user types was carried out for the Ghana sample. First, a comparison between TS and NTS revealed differences between the two groups in terms of the instrumental users class (see Table 9). NTS had a higher mean class probability compared to TS. It should however be noted that the probability in both subgroups is at a very low level. While this same phenomenon was found in the study among German students (see Dolch & Zawacki-Richter, 2018; Zawacki-Richter et al., 2015), the German students also had a higher mean class probability for NTS in the peripheral users class, but lower mean class probabilities in the entertainment users, and advanced users classes. These differences were however not observed in the Ghanaian sample. Given that the proportion of non-traditional students was relatively higher among the German students, it was conceivable to observe a significantly higher proportion of students in the instrumental users class among the German sample. This means that German students had a higher utility orientation towards media use.

Table 9. *Media usage types (Comparison of TS and NTS) – Ghanaian sample*

	student type	n	m	sd	t	df	p (2-tailed)
Entertainment Users	TS	145	0.54	0.36	1.08	235	.281
	NTS	92	0.49	0.32			
Peripheral Users	TS	145	0.05	0.20	0.45	235	.657
	NTS	92	0.04	0.17			
Advanced Users	TS	145	0.40	0.36	-0.93	235	.352
	NTS	92	0.45	0.34			
Instrumental Users	TS	145	0.01	0.02	-2.32	96.83	.062*
	NTS	92	0.02	0.09			

*p value < .05

Secondly, a comparison of gender revealed no significant differences between the two groups – male and female – in all user types in the Ghana study (see Appendix 4). In the German study, however, males within the entertainment users class had a lower mean class probability, but a higher means class probability for the advanced users class.

What stands out clearly from the results is that the pattern of media use in both Germany and Ghana are not different, taking into consideration the hierarchy of the class proportions within each user type: entertainment users > advanced users > peripheral users > instrumental users. The key difference was how the student types responded to the media use within each category. The differentiation can be found in the usage patterns between traditional and non-traditional students among the German students for all four media usage types, but only for one (instrumental users) among the Ghanaian students.

Conclusion and Suggestions

The present study's aim was to take a slight departure from the usual Western lens through which media usage patterns of higher education students are examined (Breines et al., 2020). It achieved this by comparing datasets from a developing country (Ghana) and a developed country (Germany). Data collected on students' access to digital devices; perceived value of digital media, tools, and services used for learning; gap analysis of the actual and desired use of digital teaching and learning formats; and types of media usage profiles among students, formed the basis of analysis. Although the results are limited to Germany and Ghana as samples within the Global North and Global South respectively, the comparison provides valuable insights into the differences and similarities between students in two regions with contrasting digital ecosystems, which can be used to derive implications for global higher education digital teaching and learning.

It is evident from the results that students in both contexts have access to various types of digital media despite the socioeconomic differences between the two countries. Mobile devices were particularly prevalent, and supports the observation made by previous research regarding the access levels and use of mobile devices in Ghana (e.g., Edumadze et al., 2019; Kelly & Firestone, 2016), as well as in other developing country contexts (Grothaus et al., 2021; Madge et al., 2019). It also explains why this study found high rates regarding the perceived value of chat/instant messaging in both Ghana and Germany, with mobile phones extensively used in support of their academic activities. Unfortunately, the pedagogical use of the mobile phones in Ghanaian universities and other developing country contexts have been found to be woefully underutilized (Adzifome & Agyei, 2023; Kaliisa et al., 2019), and rather used for entertainment purposes rather than advancing their use for learning (Adarkwah, 2021; Amoah et al., 2020). Additionally, policy frameworks for the integration of mobile in learning remains largely absent within the higher education space in Ghana (Adzifome & Agyei, 2023).

The study further showed that Ghana still lags behind in terms of closing the gap regarding fixed broadband internet connectivity due to its high cost of service provision (Tahiru et al., 2020). This perhaps is one of the most important hurdles to overcome in Ghana's quest towards advancing in digital education and explains the significant disparity between the demand and supply of digital teaching and learning formats within the universities of both contexts. Poor internet provision has not only been a digital divide factor in higher education (Eze et al., 2018; Gama et al., 2022), but also in the context of continuing education (Lee & Zawacki-Richter, 2021) and can therefore be attributed to the general economic disparities between the Global North and the Global South. The reliance on mobile devices for learning is explained by the alternate connection route mobile internet provides, hence the majority of students falling into the entertainment users class. This further exacerbates the digital skills deficiencies of students as mobile devices have been identified as a limiting factor in the development of digital skills of students in developing country contexts (Fernandez et al., 2023). However, the

identified typologies provide pointers for instructional designers and teachers in Ghana for utilizing entertainment-oriented media such as social networks, videos, and messaging applications to achieve educational outcomes in a very mobile-driven and digitally challenging context.

The study further showed Ghana's undifferentiation between traditional and non-traditional students, reflecting a seeming traditional approach to non-traditional learning, which may be attributable to the low technology infrastructure not supportive of technology-enabled non-traditional learning (Agormedah et al., 2020; Agyemang & Dadzie, 2010; Arthur-Nyarko et al., 2020). As such, Ghana's higher education can thus be described as having a slow response rate to the modern practices and affordances of Open, Distance, and Digital Education (ODDE). However, given the increasing demand for higher education in Sub-Saharan Africa, this is a critical area that needs to be addressed. Non-traditional students spend considerable time outside the campus setting due to competing family and work responsibilities, therefore, are more inclined towards embracing flexible learning options (Johnson et al., 2018; Kahu et al., 2014; Zawacki-Richter et al., 2015). Consequently, provision of digital teaching and learning formats that align with the needs and preferences of such students could lead to a more enriching learning experience. In view of this, more opportunities for flexible learning formats such as blended learning and online distance learning must be aggressively pursued since it has the added benefits of widening access and participation in higher education (Kibelloh, 2021; Schleicher, 2020).

Without a doubt, the bold claim can thus be made that mobile devices and mobile internet have traversed the digital divide. Yet the two contexts are worlds apart in terms of fixed broadband internet provision. While the effort for making progress in blending technology in the higher education space of many developing countries is recognized, the institutional provision of technologies and supporting infrastructure is low. Therefore, HE policy makers must address the internet infrastructure challenges in order to derive the relevant digital educational outcomes. Despite the gap in the provision of digital teaching and learning formats between Germany and Ghana, previous studies have decried the appropriate integration of technology in Germany's higher education (Bond et al, 2018; Initiative D21, 2020, p. 10f). This prompted significant federal funding for research initiatives aimed at enhancing pedagogical practices through technology, with the overarching goal of preparing students for the digital era. Therefore, Ghanaian HE policymakers must take lessons from the German experience and be informed by evidenced-based approaches while embarking on any form of digital transformation effort.

HE leaders and policymakers in resource-scarce contexts must also de-emphasize the obsession to match the supply and provision of digital tools in institutions in the developed world, without addressing the facilitating conditions. It is essential to continually examine what works within a context (Panda & Mishra, 2020), especially when low-tech and low threshold applications have proven to be useful in education delivery in digitally challenged contexts. In such situations, the combination of print-based and digitally mediated options for non-traditional learning is possible (Hillier, 2018; Mays, 2023). The key lesson here is that any form of digital expansion must be carefully and thoughtfully planned. This can however not be done without the accompanying relevant professional development of teachers and instructional designers, and the expansion and provision of critical student support services to enhance their digital learning experiences. As such, priority should be placed on the people (students, teachers, instructional designers) and the learning improvements made as a result of the technologies, rather than the technologies themselves. This requires developing the necessary policy frameworks for supporting ODDE must be developed, with the ultimate goal of improving the digital skills and graduate attributes expected of students to make meaningful contributions to the development of their societies in the digital age.

In conclusion, this study only offers a foundational understanding of media usage patterns of higher education systems with two contrasting sociocultural and structural factors located in the Global North and the Global South. However, the media usage patterns do not provide an indication of the media usage skill levels nor their pedagogical utilization. The similarities and differences between the two study contexts are clear and important for informing the media selection stage in the instructional design

process. However further studies will be required to assess media use and its pedagogical impact. The study does not also take the institutional level factors such as support services, management support, quality assurance, etc. into consideration. Therefore, it would be useful to compare the strategic measures put in place by higher education administrators towards a comprehensive understanding of the digital transformation efforts in developed and developing countries.

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Appendix

Appendix 1: Study subjects of survey participants (Germany, 2018)

Rank	Study Area	n	Valid %
1	Engineering	539	33
2	Economics and Law	403	24
3	Mathematics, Natural and Agricultural Sciences, Veterinary Medicine	180	11
4	Humanities and cultural sciences, Art	164	10
5	Pedagogy, Sports, Psychology	164	10
6	Social Sciences	144	9
7	Human Medicine, Health Sciences	62	4
Valid Total		1656	100

Appendix 2: Study subjects of survey participants (Ghana, 2020)

Rank	Study Area	n	Valid %
1	Business Sciences & Economics	78	30.8
2	Science, Technology, Engineering, and Mathematics (STEM)	70	27.7
3	Arts & Humanities	37	14.6
4	Education & Social Sciences	35	13.8
5	Medical & Health Sciences	20	8.0
6	Natural and Agricultural Sciences	13	5.1
Valid Total		253	100

Appendix 3: Differences in the demand for digital teaching and learning formats between traditional students (TS) and non traditional students (NTS) – Ghanaian sample

	student type	n	m	sd	t	df	p (2-tailed)
virtual seminars and tutorials	TS	129	0.70	1.34	1.193	217	0.234
	NTS	90	0.47	1.50			
lectures as podcast/vodcast	TS	125	0.74	1.48	1.636	213	0.103
	NTS	90	0.39	1.61			
virtual internships and labs	TS	126	0.79	1.33	2.099	211	.037
	NTS	87	0.38	1.53			
online tests and assessments	TS	135	0.52	1.29	2.505	224	.013
	NTS	91	0.07	1.40			
web-based trainings	TS	135	0.31	1.43	0.574	223	.567
	NTS	90	0.20	1.41			
e-portfolios	TS	117	0.49	1.32	0.456	195	.649
	NTS	80	0.40	1.31			
collaborative online tools	TS	137	0.38	1.26	0.447	222	.655
	NTS	87	0.30	1.40			
audience response systems	TS	125	0.71	1.21	0.789	214	.431
	NTS	91	0.58	1.16			
material accompanying courses	TS	137	0.38	1.28	0.911	232	.363
	NTS	97	0.24	1.01			
interactive multimedia-based study	TS	130	0.60	1.29	1.103	225	.271
	NTS	97	0.40	1.40			

*p value < .05

TS = traditional student, NTS = non-traditional student

Appendix 4: Media usage types (Comparison of male and female students) – Ghanaian sample

	Gender	N	m	sd	t	df	p (2-tailed)
Entertainment Users	Female	91	0.51	0.34	-0.267	234	.790
	Male	145	0.53	0.35			.787
Peripheral Users	Female	91	0.06	0.21	0.527	234	.599
	Male	145	0.04	0.17			.616
Advanced Users	Female	91	0.41	0.34	-0.014	234	.989
	Male	145	0.42	0.36			.988
Instrumental Users	Female	91	0.01	0.06	-0.046	234	.963
	Male	145	0.01	0.05			

*p value < .05

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The study was approved by the authors' institution and informed consent provisions were clearly adhered to in the administration of the survey. Additionally, the survey data is securely kept on the server of the university of Oldenburg.

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The authors do not declare any conflict of interest.

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