A decade of first-semester students surveys concerning IT equipment and communication applications and effect of Covid-19 related experiences for first-year students in 2021

Abstract: The technical equipment of first-year students and their preferred communication applications are changing, perhaps also influenced by their experiences in the Covid-19 pandemic concerning digital teaching and learning. This paper presents the 2021 survey of first-year students at Graz University of Technology (N=1,207) and compares the results concerning devices and applications with the results of the surveys conducted since 2011. It is striking that there are no striking changes in the endowment of the that can be interpreted as an effect of Covid-19 pandemic. A question introduced in 2021 about experiences with distance online instruction and experiences with online courses before and after Covid-19 shows clearly that new students' prior experiences with online learning here have dramatically changed as a result of school closures in Austria.

1. Introduction

Knowledge about the existing equipment, communication behavior and prior knowledge of first-year students is important for the e-learning support team at any university. Therefore, a survey on this topic has been conducted at the central introductory event at Graz University of Technology (TU Graz). The questions allow for a good comparison of the data since 2011.

Already in our last survey (Nagler et al., 2021) the potential changes of IT equipment of first-year students through the experiences of the first Covid-19 wave were examined. At least those who attended school prior to the study were confronted with school closures here and are assumed to have experienced technology-supported distance learning, at least partly. In fact, however, only one clear possible effect was visible in the results regarding the students' equipment, namely a decrease of the prevalence of portable powerpacks (Nagler et al., 2021). However, it remained unclear in the study why there were no clear effects. This could also be explained by the fact that many students are male and attended military service or alternative service during the first wave of the pandemic, which means that the closure of schools did not play a role before their studies. Another possible explanation is that during the emergency changeover at schools immediately before the final exams, not much online teaching took place.

By the start of the academic year 2021/2022 at the latest, the proportion of students experiencing digitally supported distance learning at school should be significantly larger and - if there are effects - these should now be clearly visible. We asked specific questions about the experiences of first-year students in 2021.

2. Research questions, method, and procedure

Like our analysis before and especially last year (Nagler et al., 2021) the following research questions will be answered:

- How has the digital equipment of first-year students at TU Graz changed throughout the last 10 years (2011-2021)?
- How is the use of digital communication and social media applications changing among first-year students at TU Graz?
- How did the experiences with online learning of first-year students change due to the COVID-19 pandemic and related school closures?

For 15 years now, surveys have been conducted annually among TU Graz first-year students and (partly) published (Nagler & Ebner, 2009; Ebner & Nagler, 2010; Ebner et al., 2011; Ebner et al., 2012; Ebner et al., 2013; Ebner et al., 2014; Nagler et al., 2015; Nagler et al., 2016; Nagler et al., 2017; Nagler et al., 2018; Nagler et al., 2019; Nagler et al., 2021). The question on equipment and applications used has been asked in a comparable form since 2011, although there have always been little changes in the naming of individual tools. We therefore used and combined the data of all surveys beginning with data from 2011, resulting in a total of 9,693 records over the years.

In our 2021 survey, questions regarding young people's experiences with online learning and digital teaching were added for the first time. On the one hand, students were asked about the extent of their experience with digital teaching and learning in the period before the COVID-19 pandemic, and on the other hand, about the extent since the beginning of the COVID-19 pandemic. Furthermore, they were asked to what extent they perceive their experiences with digital teaching as positive.

4. Results of the survey amongst first-year students at TU Graz from 2011 to 2021

4.1 Participants of the 2021 survey

As in the years before, our first-year students survey took place during the "Welcome Days", the introductory event for all BA first-year students lasting two days at the end of September. During these days, the new students are welcomed and offered numerous introductions. Since the beginning, the survey itself has been conducted as a pen-and-paper survey as part of the event, which in our view is a guarantee for a high response rate and low proportion of missing data. In 2021, as in 2020, the Welcome Days took place under special hygiene rules, but could be held - distributed over many large lecture halls - partly in presence and partly online.

According to the TU Graz (2022) statistics, 1,602 people started studying at the university in winter semester 2021/2022. Not all of them attended the Welcome Days, but 1,207 students participated in the survey in 2021. This is an absolute record - the numbers have always been in triple digits since the surveys began. One reason for this could be that there are first-year students who are also enrolled at the University of Graz, but in 2021 there were no Welcome Days there.

Table 1 shows details about gender and age are in the normal range and variations.

Table 1: Gender and age of survey participants in 2021

Key characteristics of the study beginners		2021
Number of evaluable questionnaires (N)		1,207
Gender (in percent)	female	33.4%
	male	58.7%
	diverse	0.3%
	(not answered)	7.6%
Age	mean	20.098
	median	20
	standard derivation	2.577

4.2 Equipment

In the last decade, there have been significant changes in the IT equipment of first-year students at Graz University of Technology (see Fig. 1). Smartphones have increased considerably at first, but in recent years there has been a declining trend. The classic cell phone and MP3 player have become much less important in the last decade. If you take a closer look, you will see that desktop PCs are slightly up again after a downward trend since 2017, while laptops are down. It is interesting that the slight downward trend for smartphones and upward trend for classic phones is continuing. Overall, there are no clear differences in the 2021 survey. There was a slight dip in the tablet segment in the 2020 survey. However, tablets have always been in a range between 25% and 30% since 2015, and that is also the case this year.
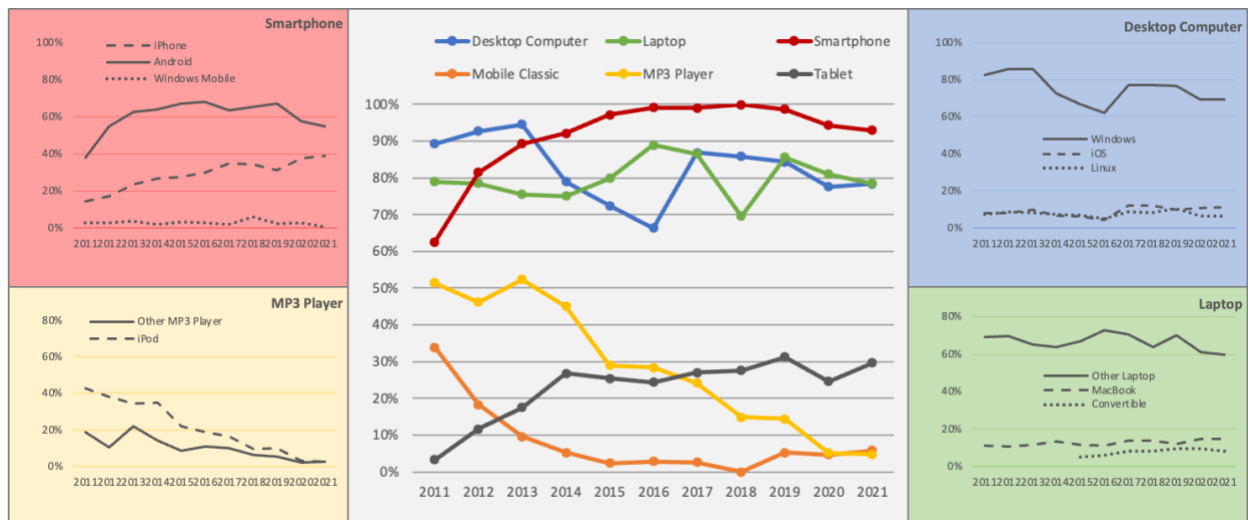
Figure 1: Equipment for first-year students at TU Graz over time from 2011 to 2021. Source: Annual survey amongst study beginners at TU Graz (n2011=632, n2012=715, n2013=789, n2014=968, n2015=889, n2016=944, n2017=872, and n2018=898, n2019=824, n2020=955, n2021=1,207).

4.3 Wearables

It is striking that Smart-TVs play a lesser role in the last two years. Apart from Smart-TVs, all gadgets (tend to) have a slight increase. Perhaps laptops and desktops are used instead of Internet-ready TVs. Portable power packs (PPP) are also more in demand again in 2021. In the 2020 survey, they were the only indicator of change in first-year students' equipment - probably due to the long homeschooling periods. Smart watches and smart speakers also continue to see slight growth.
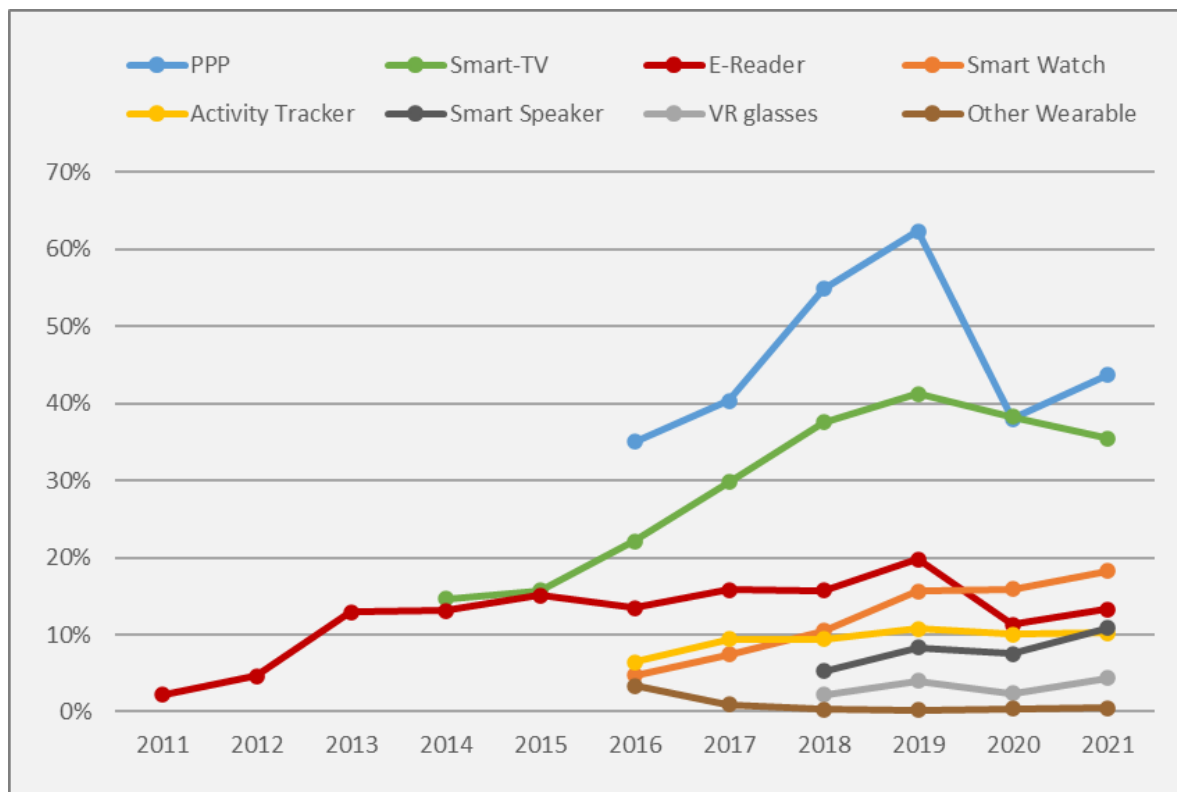
Figure 2: Wearables and digital equipment of first-year students at TU Graz over time from 2011 to 2021. Source: Annual survey amongst first-year students at TU Graz (n2011=632, n2012=715, n2013=789, n2014=968, n2015=889, n2016=944, n2017=872, and n2018=898, n2019=824, n2020=955, n2021=1,207).

4.4 Communication applications

WhatsApp continues to be the most important means of communication - problematic for the Educational Technology unit at TU Graz because students cannot be reached with it. SMS surprisingly shows some trend reversal - matching the increase in classic cell phones. Signal has grown significantly, and so has the general category of "other Internet-based video telephony." The Skype application has clearly lost importance after a few years of dominance.
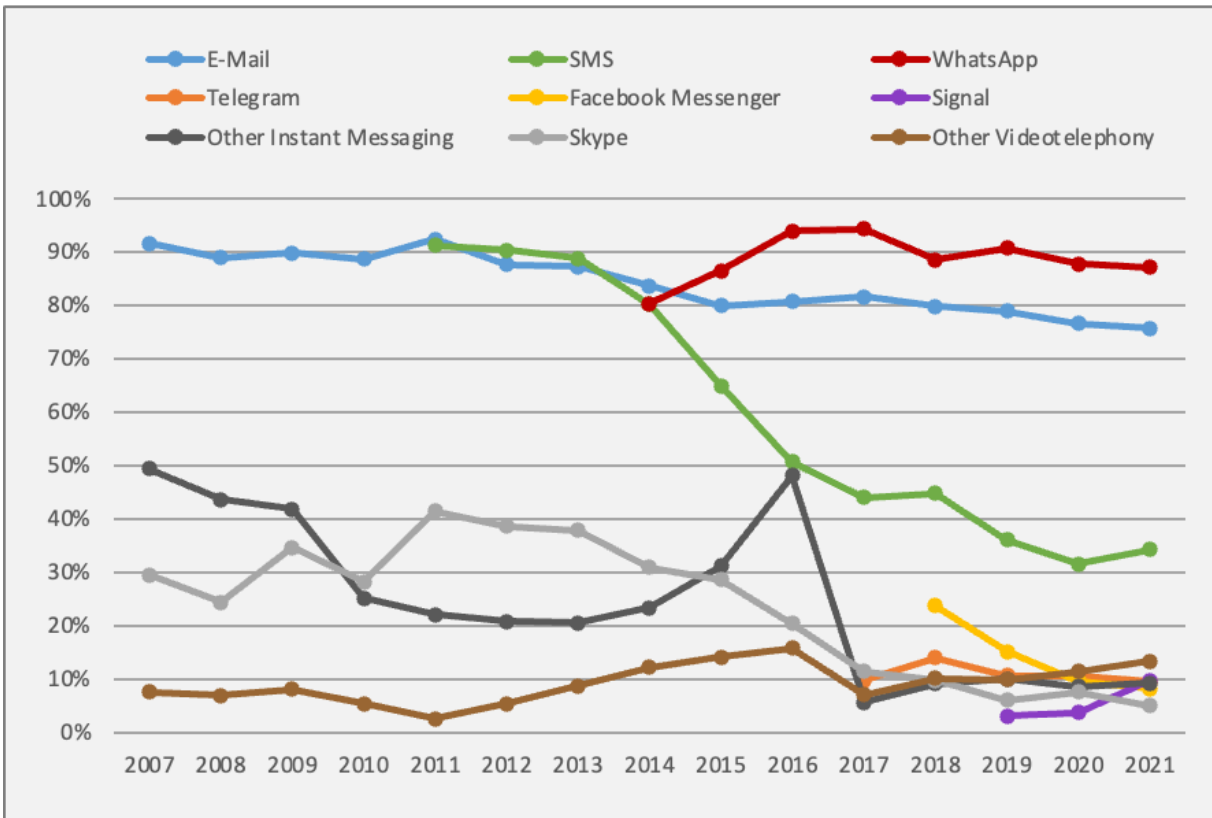

Figure 3: Communication tools of first-year students at TU Graz over time from 2011 to 2020. Values refer to frequent and daily use. Source: Annual survey amongst study beginners at TU Graz (n2011=632, n2012=715, n2013=789, n2014=968, n2015=889, n2016=944, n2017=872, and n2018=898, n2019=824, n2020=955, n2021=1,207).

4.5 Social Media tools

Image-based social media applications (Instagram, Snapchat, Pinterest) are gaining in popularity again in 2021. Facebook continues to decline. At the same rate of decline as in recent years, it should be irrelevant for first-year students in 2022.
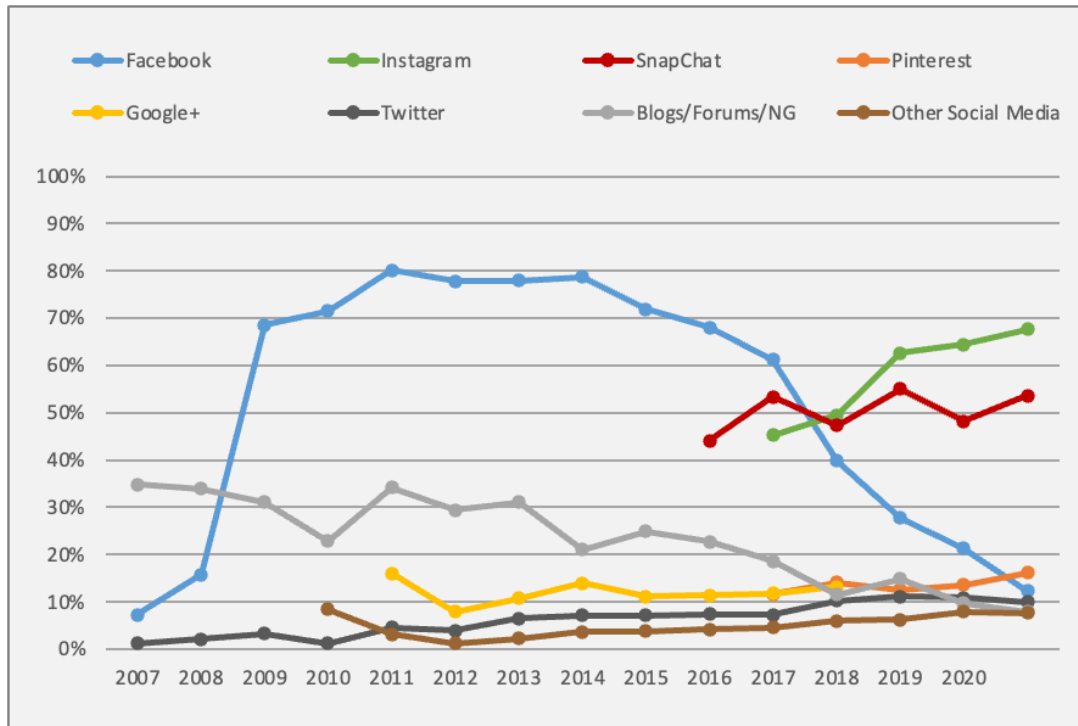
Figure 4: Social Media tools used by first-year students at TU Graz over time from 2011 to 2021. Values refer to frequent and daily use. Source: Annual survey amongst study beginners at TU Graz (n2011=632, n2012=715, n2013=789, n2014=968, n2015=889, n2016=944, n2017=872, and n2018=898, n2019=824, n2020=955, n2021=1,207).

4.6 Effects of the COVID-19 pandemic on equipment and communication behavior of first year students

There are no significant major changes in the 2021 survey. Like 2021, we also do not see any way to infer that and how student equipment has changed because of the pandemic or that there is an impact here. In the 2020 survey, we could see a significant drop in the prevalence of portable power packs, which we had interpreted as an effect of the pandemic (Nagler et al., 2021). We do not see something similar or any other change this year that we dare to interpret as a changed usage pattern following the pandemic. However, we suspect that the interpretation of "frequent" after months of online teaching and intense media usage use may refer to other reference variables of the pre-pandemic years and "normal" behavior, but we cannot substantiate this.

4.7 Experiences with online learning and teaching of study beginners with and without intense Covid-19 experiences

2021 was also the first time that first-year students were explicitly asked about their prior experience with online learning. They were asked to answer the questions about their experience before the pandemic (i.e., until spring 2020) and then in fall 2021. A direct comparison of the different responses is shown in Fig. 5.
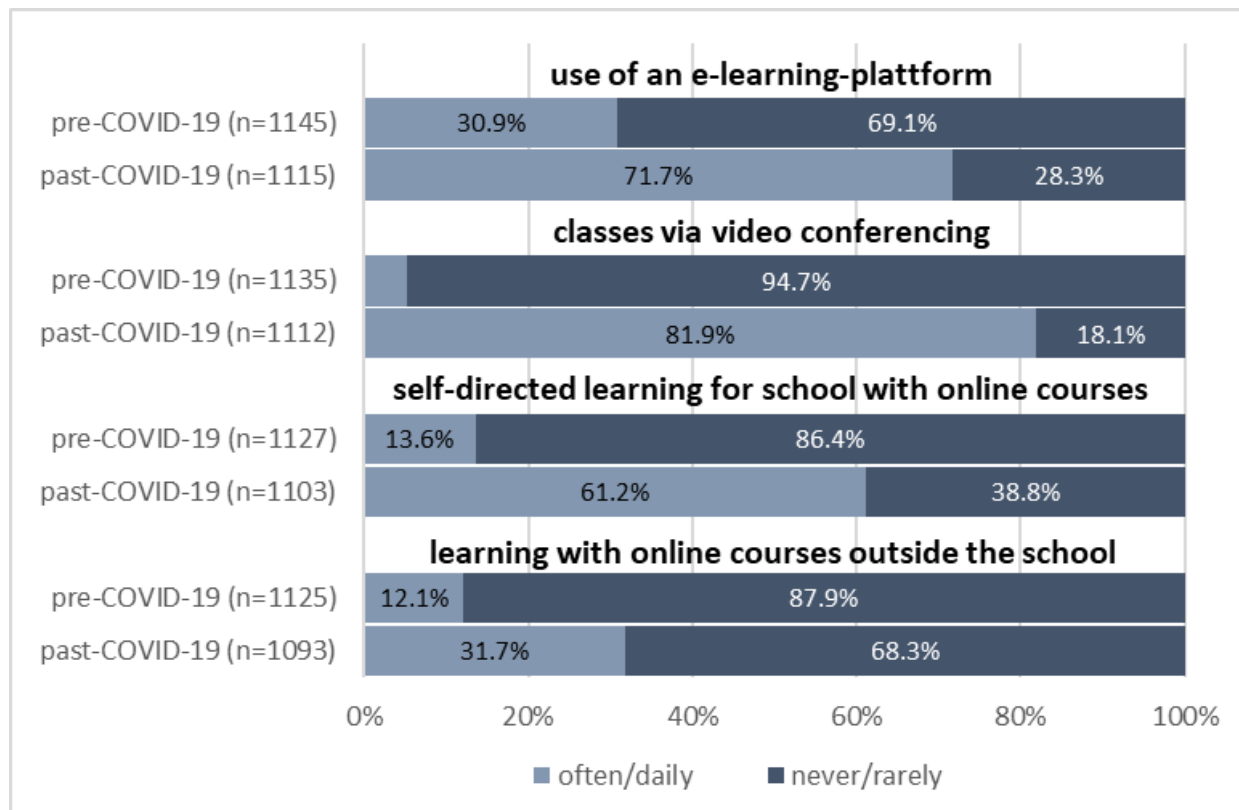
Figure 5: Online learning and teaching experiences of study beginners at TU Graz.

There have been significant changes in this area. The use of e-learning platforms has more than doubled. Instruction via video conferencing is normal for more than 80 percent of first-year students - these are probably mainly those who still attended school in 2021: Austria is one of the countries where no frontal teaching took place for months, especially in secondary schools (c.f. Tengler et al., 2020). The use of online courses has also changed significantly because of the pandemic: Instead of only around 14 percent, more than 60 percent now have experience with online courses, and around 31 percent also used them outside the school context.

Additionally, all participants in 2021 were asked to rate how much they agree that online classes were a positive experience for them. As shown in Table 2, about 60 percent had a (rather) positive experience with it.

Table 2: Agreement with the statement "Online classes were a positive experience for me" (N=1,115).

agree	171	15.3%
rather agree	508	45.6%
rather disagree	370	33.2%

disagree	66	5.9%
total	1,115	100.0%

4. Discussion

After analyzing the survey of first-year students in 2020 (Nagler et al., 2021), we were very curious to see if and what changes in student equipment could be observed in 2021. In fact, no significant changes can be perceived that can be clearly explained by the Covid-19 pandemic. However, the newly added questions on prior experience - and changes in this prior experience due to the pandemic - show very clearly that the prerequisites and prior knowledge of first-year students in terms of technology-based distance learning differ significantly - certainly also from all cohorts before.

5. Outlook

We are not planning any major changes for the 2022 survey. Only for the question block on social media applications will we probably ask about the use of Facebook for the last time in 2022 and plan to ask specifically about TikTok for the first time.

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