DIGITAL DEVICES AND INTERPERSONAL COMMUNICATION OVER TIME

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Abstract/Izvleček
Digital communication supported by mobile devices has an essential impact on interpersonal relations. Face-to-face communication is significantly affected because of the habits of simultaneous use of mobile devices and digital communication. The effect on interpersonal relations is negative since the behaviour affects personal closeness, empathy, and trust, including the feeling that a physically present person is unwanted or redundant, even replacing face-to-face communication with text messaging. The behavioural patterns significantly change if a loved one is involved. Results show that behaviour patterns did not change considerably over five years. Simultaneous digital communication, replacing face-to-face contact or voice call with text messaging is still present, with minor deviations in the post-pandemic period. Nevertheless, personal contact with beloved persons is still the primary preference over time compared to digital contact.

Digitalne naprave in medosebna komunikacija skozi čas
Digitalna komunikacija, podprta z mobilnimi napravami, pomembno vpliva na medsebojne odnose. Kadar oseba hkrati uporablja mobilno napravo in digitalno komunicira, je medosebna komunikacija zelo omejena in negativno vpliva na medosebne odnose. Tako vedenje vpliva na osebno bližino, empatijo in zaupanje, vključno z občutkom, da je fizično prisotna oseba nezaželena ali odveč. Vedenjski vzorci pa se bistveno spremenijo, ko je prisotna ljubljena oseba. Rezultati kažejo, da se vedenjski vzorci v petih letih niso bistveno spremenili. Še vedno sta prisotna sočasna digitalna komunikacija in nadomeščanje medosebnega stika ali klica s tekstovnim sporočanjem, z manjšim odstopanjem v obdobju po pandemiji, ki kaže željo po več osebnih stikih. Osebni stik z ljubljenimi osebami namesto digitalnega je še vedno primarna izbira.

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Introduction

It is impossible to imagine life without digital communication via the Internet, which is supported by various technical devices. Until recently, the mobile phone was the most commonly used device for interpersonal communication involving voice calls. Nowadays, voice calls are not necessarily made exclusively by mobile phones, so the term 'mobile phone' has been replaced by 'mobile device'. Calls in any form are increasingly made via portable or wearable devices. Therefore, in our article, we use the term mobile device(s) instead of mobile phone unless it is necessary to refer to the latter device specifically. Younger generations become owners of mobile devices even before the start of formal education. As a result, the software on these devices and the influence of practically constant use have significantly changed the way of communication and lifestyle. (Matijević and Topolovćan, 2019)

Digital and interpersonal communication

As a result of lifestyle changes, certain behavioural patterns have also arisen. We mean the way interpersonal communication has been transformed from the traditional face-to-face kind to other parallel forms. Text messages, social networks, and other applications on mobile devices are in use as intermediaries. In this way, the frequency of face-to-face communication is decreasing and is being replaced by these other forms. Moreover, the Internet and especially social media, have evolved into a new format for socialization and a means of interpersonal communication (Blažević and Klein, 2022). The phenomenon particularly intensified during the pandemic. Replacing face-to-face communication with digital increased even when contacts were not officially restricted. Eighty-six percent of participants in a survey on the use frequency of both communication methods during the pandemic period in several countries confirmed the replacement of face-to-face communication with digital communication. This was done equally by women and men. However, women used video communication more often. Regarding age, younger people (up to 36 years) preferred digital communication, while older people communicated more often by voice call (Newson, et al., 2021).

The absence of direct interpersonal communication lowers the quality of relationships, and other negative consequences are also noticeable. Those include the decline of reading literacy, in the quality of messages and in the content.

Research shows that we cannot neglect the importance of face-to-face communication. People perceive face-to-face interactions as more valuable or meaningful, enabling better social connections and emotional closeness than digital communication like text messages, e-mail, social media, etc. Digital communication generates the absence of nonverbal cues, such as facial expressions, body language, tone of voice, and eye contact, which convey emotions and intentions (Nguyen, et al., 2022).

On the other hand, digital or computer-mediated communication allows interpersonal connection when someone is not physically present for various reasons. The benefits are closely dependent on the ways digital communication is used (Newson, et al., 2021). According to Liu (2019), text-based messaging brings positive associations with psychological well-being, while gaming brings negative associations.

The value of face-to-face communication in interpersonal relationships is unquestionable. Of course, we cannot pay attention to this alone. Digital communication is practical, enabling connection, constant communication, and availability. Our research focuses on interpersonal relationships and the simultaneous use of digital communication, mainly from the perspective of teacher education since our students, as pre-service teachers, will teach children in the near future, and many of them already display such behavioural patterns.

Many mobile device owners admit to using them during various social activities, including face-to-face communication. Such behaviour causes unfavourable feelings for the person involved. This kind of behaviour affects personal closeness, empathy, and trust. Affected persons feel that a virtual person is more important than a physically present person. The oddest situation, according to Štrukelj (2017) is the use of a mobile device even during sexual intercourse, which has a directly negative impact on relationships. All such behaviour patterns can, without exception, be classified as the Phubbing phenomenon. Phubbing means ignoring the present person in favour of a mobile device, thus harming the relationship.

In most cases, phubbing is present among closely related persons, and among partners, it often causes jealousy (Al-Saggaf and O'Donnell, 2019). Phubbing has become increasingly common since mobile devices have been around to play a significant role. It often happens when individuals are engaged in face-to-face conversations, social gatherings, or other interpersonal situations.

When someone participates in phubbing, they may constantly check their phone, browse social media, send text messages, or engage in other digital activities instead of being fully present in the conversation or the moment. This behaviour can be seen as disrespectful and negatively affect interpersonal relationships. Phubbing can lead to feelings of exclusion, frustration, and decreased social connection for the person being ignored. (Chotpitayasunondh and Douglas, 2018). It conveys that the person's presence or conversation is less important than digital distractions. Over time, repeated phubbing can erode trust and intimacy in relationships and hinder effective communication.

Multicommunication

The simultaneous use of mobile devices and digital communication negatively impacts interpersonal relations. However, when more people are involved for some reason, multiple forms of communication can confer benefits, for example, if group interaction is required or desired during organizational sessions or meetings. The group members can simultaneously interact through text messaging in any form and or face-to-face interaction. However, this solution or possibility is not always welcome and is considered distractive. Some researchers classify this under the term multitasking, which is a practice mainly attributed to younger people. More descriptively, the concept of simultaneous communication can be described by the term multicommunication, which supports effectiveness, participation, and task orientation (Paskewitz and Beck, 2019). We believe that the concept is suitable for corporate activities, but less so or not at all, from the point of view of interpersonal relations and education.

Text messaging as digital communication and education

We must recognize the concerns that text messaging, as an integral part of digital communication, leads to decreased writing quality. Some research also suggests a decline in reading literacy and in the quality of message writing as side effects, primarily of text messaging. All this is mainly due to emoticons, which replace words and enable a shortcut past grammatically correct notation. Some studies suggest that emoticons enhance expressivity in communication, and people may even perceive messages without these as rude (Sanpietro, 2020).

The survey about the grammar of emoji shows that textual communication with emoticons does not involve grammatical complexity (Cohn, Engelen, and Schilperoord, 2019). We have no absolute confirmation of this, as opinions change over time. In the period before the pandemic, the view prevailed that the effects were negative, but according to other research results, the impact of text messaging on literacy does vary. Some studies have found a positive correlation between texting and literacy, while others have found negative or non-significant correlations. One example of such a negative impact is the finding that points to the fact that students who use text messaging need more time to complete a reading task or may feel sleepy during the daytime (Yilmazsoy, Kahraman, and Köse, 2020).

On the other hand, a summary of research (Using texting to promote learning and literacy, 2014) on the impact of text messaging shows the positive role of its use for building foundational reading skills and encouraging the participation of students with learning disabilities or those who have difficulty engaging in discussions or do not feel confident about participating in class discussion. Even in persons with dyslexia, establishing a positive relationship with reading ability may result. The analysis of more than five hundred text messages showed creative, communicative ability without affecting the quality of language expression. Most existing research is conducted on younger children from the upper grades of primary and secondary schools. Therefore, the researchers emphasize that the focus in the future should be on the impact of text communication in connection with formal academic language, which lies more in the domain of older adolescents.

Regardless of the divergent findings, we believe choosing between the beneficial effects and the excessive use of digital communication, especially in education, is necessary. Constant changes in findings are evident regarding the analysis of teachers' views on the reception ability of younger students after emergency remote teaching. The results show moderate and significant differences in receptive skills (Kerneža, 2023). Although this fact is not directly related to the consequences of excessive digital/text communication, it somehow belongs in the context of digital communication. In general, text communication, as part of digital communication, does not affect reading literacy and understanding of messages among older adolescents.

Methodology

Purpose
The research aims to identify changes in social behaviour involving the use of mobile devices over the years. We paid extra attention to the differences before and after the pandemic. The research focused on social interaction between two persons and on interaction between the person and a group of persons.
The following research questions were posed:

- Have there been any changes in the time students spend on digital communication per day?
- Have there been any changes in the time students spend using mobile phones per day?
- Has behaviour involving simultaneous use of mobile devices during in-person contact changed over time?
- Has the behaviour of simultaneous digital communication during contact with single or several people changed over time?
- Has there been any change in the preferred type of digital communication with a beloved person over time?
- Has the usage of textual messages instead of voice calls changed over time?

Sample
The sample includes 417 pre-service teachers (hereafter, students) of Elementary Education and Preschool Education at the Faculty of Education in Maribor and students of Pedagogy at the Faculty of Arts in Maribor. These students were attending the first year of study in the academic years 2018/19 (185 students), 2021/22 (101 students), and 2022/23 (131 students). The survey does not include the 2020/21 academic year because of the pandemic. The average age of the students is 20 years. The structure of the sample by study program shows Table 1.

Table 1. Students in the sample by academic year

	Frequency	Percentage
2018/19	185	44.4
2021/22	101	24.2
2022/23	131	31.4
Total	417	100.0

Data collection

Data were collected by questionnaire using the online surveying tool. To exclude the eventual effect of novice students' uncertainty, they received the questionnaires in the summer semester, which we found to be a reasonable time for adaptation. The data were processed using SPSS statistical software, using the statistical methods of descriptive statistics, chi-square test, ANOVA, and selected non-parametric tests for analysis of the rating scales.

Results

Digital communication per day

Communication and digital communication in particular are a necessity and a daily routine, whether in the desire for information or for assigning tasks or assignments. The students estimated the time spent on digital communication per day. The results in the Table 2 show the average time spent on digital communication over time, considering all communication tools such as social media, e-mail, messaging applications, etc. Only valid responses are analysed.

Table 2. Digital communication per day (in hours) by academic year

Academic year	N	Mean	SD	F
2018/19	185	4.23	2.775	
2021/22	101	3.46	2.390	2,929*
2022/23	131	3.63	2.631	
Total	396	3.75	2.411	

*$p<0.05$, df=2

The average time spent on digital communication is between 3 and 4 hours daily. Compared to the academic year 2018/19, the amount of time has decreased. According to the general opinion that more communication is being conducted digitally, this result is unexpected. We estimate that the most reliable reason is that it is difficult to correctly estimate the time spent on it, given the multitude of digital communication forms. The results also show the least time spent on digital communication being during the pandemic, when in-person interactions were limited. It is somehow surprising, since researchers discovered that direct, in-person interactions during the pandemic and after were replaced by digital communication (Skalacka and Pajestka, 2021). In our opinion, the reason is that digital communication plays more of a supportive role and less the role of a replacement for in-person interaction. We should investigate this phenomenon in the future.

Daily use of mobile phones

In terms of their functionality, mobile phones serve more as multifunctional communication devices than telephones exclusively. Despite being aware of this, we ask students to estimate the daily time spent on ordinary phone calls. The results in Table 3 show the average time for phone calls. Only valid responses are analysed.

Table 3. Table: Average daily use of mobile phones in hours by academic year

Academic year	N	Mean	SD	F
2018/19	180	4.21	2.799	
2021/22	94	3.02	1.760	
2022/23	38	3.63	2.066	8.008*
Total	396	3.75	2.411	

*p<0,05, df=2

The students report spending between 3 and 4 hours daily making phone calls. This time has decreased, reaching the lowest level during the pandemic, after which it increased again. The lowest average time spent making regular phone calls corresponds with the findings shown in the Table 3, which emphasizes other forms of digital communication. During the pandemic, the amount of time expended on digital communication via messaging, social media, and e-mail increased at the expense of regular phone calls (Nguyen, et al., 2020). The decreased time spent on phone calls agrees with these findings.

Despite this, there is a specific reservation about the results because using mobile phones to facilitate a variety of digital communication media can make it difficult for students to accurately estimate the usage time for one particular form of digital communication. In this case, we are only talking about normal phone calls, not any type of voice calls over a broadband internet connection or, more technically correct, Voice Over Internet Protocol (VoIP). Nevertheless, the results are interesting and provide an answer to the research question posed.

Interpersonal behaviour over time

Recently, many experts on social and society relations, including technology gurus, have pointed to problems in establishing quality interpersonal relationships due to inappropriate and simultaneous use of ICT during meetings. The problem is that people find face-to-face interactions more meaningful and useful for building social relationships and emotional closeness (Nguyen, et al., 2022). Being aware of those facts, we expect changes in behaviour involving simultaneous use of mobile devices during in-person contact and analyse the answers from the past three academic years. The focus is on simultaneous digital communication during face-to-face contact with another person or several persons.

Our observations show that the habit of simultaneous digital communication during face-to-face contact is widespread, regardless of whether one or more persons is involved. The analysis by the Kruskall-Wallis test in the Table 4 presents the state of this habit over time.

Table 4. Simultaneous digital communication during face-to-face contact by academic year

	Academic year	N	Mean Rank	p
Simultaneous digital communication during face-to-face contact with several persons	2018/19	185	210,32	
	2021/22	94	186,01	
	2022/23	123	200,08	0.196
	Total	402		
Simultaneous digital communication during face-to-face contact with one person	2018/19	185	213,15	
	2021/22	94	192,10	
	2022/23	123	191,17	0.120
	Total	402		

Whether one or more persons is involved in face-to-face communication, the habit of simultaneous communication remains the same over time.

The observed differences between the academic years are not statistically significant (p>0.05). The outcome is not encouraging, considering that paying full attention to the person(s) to whom we are talking is more appropriate. More detailed analysis indicates that this is not such a poor outcome as it appears at first glance. The results in Table 5 suggest that the most frequently chosen options in academic years and, regardless of the number of persons involved, are "rarely" and "occasionally". Such an outcome is better than we could have inferred from the results in the previous tables, but such behaviour is very common.

Table 5. Habits in digital communication during face-to-face contacts by academic year

Simultaneous digital communication during face-to-face contact with several persons			
	2018/19	2021/22	2022/23
	%	%	%
Never	4.3	3.2	4.9
Rarely	36.2	51.1	43.1
Occasionally	49.2	37.2	39.0
Very often	10.3	8.5	13.0
Total	100.0	100.0	100.0
Simultaneous digital communication during face-to-face contact with one person			
	2018/19	2021/22	2022/23
	%	%	%
Never	13.5	14.9	17.9
Rarely	50.8	60.6	56.1
Occasionally	32.4	22.3	22.8
Very often	3.2	2.1	3.2
Total	100.0	100,0	100.0

Less than 5% of students never e-communicate simultaneously in the presence of more than one person. On the other hand, when just one person is present, this is a common habit in between 13% and 18% of cases. This indicates an attitude of greater politeness towards a single person than towards multiple persons.

But there are still too many cases of simultaneous digital communication during face-to-face contact, regardless of the number of persons involved and academic year. In total, more than 80% of students in every academic year simultaneously e-communicate rarely or occasionally during face-to-face contact, regardless of how many persons are involved. Such a situation is bad and indicates worsening interpersonal respect and relationships. We believe that this requires in-depth sociological analysis.

Preferred type of digital communication with a beloved person over time

The previous analysis reveals the behaviour in interpersonal communication when fewer affiliated persons are involved. When communicating with a loved one, a different attitude can be expected, mainly because contact and communication among beloved persons are more personally oriented and feature closer personal interaction. Communication via social media, messenger apps, or simple text messaging options is meant under the electronic communication option. The results in Table 6 show communication preferences over time.

Table 6. Preferences in communication with a beloved person

	Academic year		
Preferred way of communication	2018/19	2021/22	2022/23
Preferably electronically	1 (0.5%)	4 (4.3%)	2(1.6%)
Preferably in person	110 (59.5%)	59 (63.4%)	69 (56.1%)
Both ways equally	14 (7.6%)	6 (6.5%)	12 (9.8%)
Adapt communication to the needs or	60 (32.4%)	24 (25.8%)	40 (32.5%)
Total			

χ^2=6,920, df=6, p>.05 Numbers in parentheses indicate column percentages.

The results regarding the findings of simultaneous digital communication during face-to-face contact are significantly more favourable. The preference for maintaining personal connection prevails, regardless of the academic year, followed by adaptation when required by circumstances. Nearly 60% of students prefer personal contact with a beloved person rather than digital communication. This share remains constant over time.

A slight increase is noticeable for the academic year 2021/22, which we consider to be the consequence of the post-pandemic period and the re-establishment of personal contacts. Considering the modern trend towards full-time work, the need to periodically adjust contact options is understandable, and almost a third making this choice is not a bad result. However, a lower share appears again in the academic year 2021/21, owing to the re-establishment of personal contacts after pandemic restrictions and the desire for closer connections. The proportion of students communicating with a loved one exclusively electronically is negligible, again with a minor increase in the post-pandemic period. However, a relatively uniform share of those who are equally likely to communicate in person and electronically is noticeable throughout the years. In these cases, we believe it is about people with a specific social deficit, anxiety, or difficulty establishing relationships with others.

Messaging instead of voice conversation

Changing patterns of social behaviour lead to more frequent use of communication services like text messaging, multimedia messages, or social media to avoid voice conversation. The five-level scale was used to estimate the extent of the habit of using messaging services instead of voice conversation. The scale range is from never to always.

Table 7. Using messages instead of voice calling

| | Academic year | | |
	2018/19	2021/22	2022/23
Rarely	24 (13.0%)	21 (22.6%)	12 (9.8%)
Occasionally	60 (32.4%)	31 (33.3%)	39 (31.7%)
Very often	91 (49.2%)	34 (36.6%)	60 (48.8%)
Always	10 (5.4%)	7 (7.5%)	12 (9.8%)

$\chi^2=10.901$, df=6, p>.05

The results in Table 7 show that nearly 50% of students often replace voice calls by sending messages, and about a third do this occasionally. Outcomes do not change significantly over time. Given that the options of 'occasionally' and 'often' avoiding voice conversation together amounted to approximately 80%, the phenomenon of avoiding voice conversation is apparently widespread.

According to the findings of previous studies, we assume that the reasons may vary, from avoiding direct conversation or having direct personal contact only when necessary, to other personal reasons. Students did not want to explain the reasons behind or purpose for such a decision. Again, we are dealing with a relatively uniform share of less than 10% of those who continually avoid voice calls by sending messages. A specific social deficit is the most likely reason. The least frequent occurrence of this phenomenon was observed in the academic year 2021/22, which could be related to the post-pandemic situation and the desire for closer contact. In general, the results of such behaviour are many short messages, often with very lax grammatical correctness.

Based on our experience working with the students, mail or text messages have many typos, lack polite phrases, and indicate poor understanding of instructions. This is particularly true for the inability to read a higher amount of textual content when instructions require this, as in the case of instructions for seminar assignments, rules for attending tutorials, and exams, along with other study obligations. Research in Canada, for example, points to a negative correlation with spelling (Grace, Kemp, Martin, and Parrila, 2014). Conversely, the traditional belief that text messaging influences reading literacy is not confirmed. A correlational, quantitative study among youngsters (Zebroff and Kaufman, 2017) showed that text messaging is not significantly associated with literacy.

Discussion

The behaviour patterns of young people when using digital communication did not change significantly over five years. There is variation only in some results related to the post-pandemic period, when the desire for more personal contacts increased slightly. However, the differences are not statistically significant compared to the previous years and last year. The time spent on digital communication is mostly constant and is estimated at just under 4 hours. Phone usage time is similarly assessed as for other kinds of digital communication. However, we are aware that the amount of time for a typical telephone conversation and the time for an equivalent type of communication in the form of VoIP when using applications are challenging to separate and assess with accuracy. Simultaneous digital and face-to-face communication is almost the norm, regardless of whether one or more people are involved.

We can easily classify this as Phubbing, which exerts a relatively strong effect on the relationship with the affected person. There is even slightly more simultaneous digital communication when only one person is involved. However, behaviour changes significantly when it comes to communication with a loved one. In such cases, interpersonal or direct communication prevails. Owing to a variety of current influences, such as all-day work, business trips, etc., the combination of face-to-face and digital communication is also desirable for maintaining contact with a loved one. The habit of writing text messages instead of voice calls is widespread. This habit shows that young people often want to avoid direct conversation and prefer the indirect option. Preferring indirect to direct conversation is a peculiar sociological phenomenon. Frequent or even excessive writing of text messages causes a flood of short and mostly grammatically or content-deficient messages, often replacing verbal expression with emoticons.

Despite the research findings not having shown a connection between text messaging and reading literacy, when working with students, we do notice a lower ability to read and understand more extensive textual content. This fact is most evident when reading teacher or administrative notices, whether electronic or printed. These communications are often poorly understood or processed without the essentials. The results also show that about 10% of students want only digital communication, which is not the most encouraging news for future teachers. The present research findings provide new directions in observing the effects of digital communication tools on interpersonal relationships. Insight and knowledge will benefit teachers and parents of children and the work of counsellors. Nevertheless, work on this topic is a constant need and challenge in the future.

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