

Age-Related Differences in Acceptability of Digital Communication Platforms Based on User Interface for Institutional Work

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ABSTRACT

The use of digital communication platforms as means for institutional work has increased immensely in recent times. Even though people of various generations perceive technology in diverse ways, there has been no concrete study on the acceptability of these digital technologies among different age groups for institutional work. This study will help us to understand the people's perspective based on their age and what type of user interface and features are preferable and acceptable. Findings from the survey which were conducted amid various aged people involved in various institutions show the differences of the inclinations of different age groups. The objective is to use the outcomes of this research for understanding people's needs based on their age and develop a simple and effective user interface (UI).

KEYWORDS

generation gap, elderly people, user interface, acceptability, digital communication platform, institutional work

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1 INTRODUCTION

Digital dependency has been growing for the last couple of eras. But within last decade, most aspects of human lives have been significantly affected by growing use of technology. The livelihood, way of learning, communication, meetings in an organization, lectures

in intuitions, and many more. Online communication or the digital mode of communication has become the most important mode of communication. It is not only used in social life, but it also used as an effective business tool[8]. Every institution now uses various communication tools like video conferencing applications or text-based messaging systems. Zoom, Google Meet, and Microsoft Teams are some of the most popular communication platforms at present[4].

But then this transformation has not been easy for a lot of people, especially the elderly. This difference in elder people is due to factors like cognitive abilities, computer self-efficacy and computer-anxiety[3]. Different aged people perceive technology in different ways. How various age-grouped people adapt and perceive institutional works in digital communication platforms based on simple and efficient UI is yet a subject of unspecified. This study will help us to understand the people's preferences based on their maturity and age, and what features need to build straightforward and effective UI is acceptable.

Several experiments and research have been done on improving the user experience between elders and youths and their ability to adapt to different technologies. Most studies are based on user experience and need-based use of the users. A number of studies have been completed regarding of digital platforms as virtual classroom, the UI of the applications, and the impact of this on students and teachers. But there has been no exploration of these communication technology based on peoples' age for the institutional task.

The hypothesis made in this study is that the older people require visually accessible and detailed UI more than the younger people in terms of acceptability. In this development, we survey users of varied age range and diverse profession on their use of different digital communication software for academic purpose. As stated, the older generation has more difficulty in adapting technology, the requirements of the older age group are more in focus for this study. Based on the survey result we determine what features and characteristics of UI are helping the users in adapting this form of technology with respect to different aged people.

2 LITERATURE REVIEW

Online communication or the digital mode of communication has become the most important mode of interaction. Various studies

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have shown that, it is not only use in our social life, but it also used as an effective business tool[8]. Every institution now uses various communication tools like video conferencing applications or text-based messaging systems. The use and acceptance of technology between different age-group is not same. Young people use and adapt technology far more easily than the elders[3, 14]. Therefore, the growth of these online communication tools must have impacted the aging personnel. This difference in elder people is due to factors like cognitive abilities, computer self-efficacy and computer-anxiety[3]. Vaportzis *et al.*[14] presented in their study that old people tend to use those technologies which are familiar and comfortable in nature. Lack of training, knowledge, guidance, and complicated interface can also lead to slower adaptability of technology between elders. We have looked into some studies that is concerning impact of age on digital technologies.

2.1 Technology Concerning Age

Significant studies and research have been conducted on improving the user experience and technology acceptance between elders. Like the study conducted by Alsswey and Al-Samarraie[1] on elderly users' acceptance of mHealth user interface (UI) design-based culture and by Braun[2] on obstacles to social networking website use among older adults". Both the studies tried to focus on the user's acceptability of technology by the elder adults. Alsswey and Al-Samarraie[1] found that age has a significant impact on the acceptance of technology. On the other hand, Braun[2] found partial significance of age on technology acceptance. Alsswey and Al-Samarraie[1] tried to incorporate cultural norms in designing UI for the elder adults. The findings of the experiment showed that the adult users accepted the inclusion of cultural aspects in the UI design. But these studies have their limitations as they only target a specific group of people. Another research was performed by Sahlab *et al.*[13] focusing on standardized design principle. They tried to address the age-gap issue by building a Pill Dispenser system following the IEC 62366 standard. The outcome was successful as all the test subjects found the UI attractive, valuable, and well structured. But this research was also conducted among limited number of targets.

2.2 Digital Platform for Academic Purpose

Judge and Murray[6] presented a study where the successfully build an online learning system based on unified and consistent UI. The system had a high acceptability rate among teachers and students compared to the existing learning system. But the outcome of the study limited to only online students. The age factor was not considered along with hybrid students who take both online and onsite learning. Study was conducted by Roque-Hernández *et al.*[11] that focused on interactive communication tools and its impact for students and teachers. The study found that the use of interactive tools as mode of online learning helps in student satisfaction and engagement. But again no impact of age was factored in.

Specific studies have also been conducted on the impact of online learning. Suliman *et al.*[15] on their paper "Experiences of nursing students under the unprecedented abrupt online learning format forced by the national curfew due to COVID-19: A qualitative research study" highlights the difficulties of accepting the online

mode of education. The study showed the requirement of technical support to handle online learning. It also revealed the transition of online learning is difficult and stressful for students. But the study has not been made from the perspective of age-related difference between workers.

2.3 Summary

Numerous systems have been developed without addressing the needs of the older people. So, a disparity in technological adaption exists to a great extent between different age groups. Complexity of a system may discourage the older people towards adapting a new technology. Since, comfort and familiarity are important factors in the use of technology for older people[14]. So, a complex device or application will always be difficult for an old people to adapt. The study that has been done so far does not answer the question how various age grouped people adapting and perceiving institutional work in digital communication platforms based on UI. As stated, there are multiple software's available in the market to meet online for institutional work such as Zoom[4], Google Meet[4], Microsoft Teams[4], Skype[9], and Slack[9] etc. Every application has few advantages in accessibility and disadvantages as well. However, all apps focus on the best user interface for better accessibility to the user without any hassle. Unfortunately, almost every app has some fall-backs as well based on different age groups. For e.g., direct share screen function when joining a meeting is confusing and not required[12]. Sometimes in the latest updates, a pop-up window during a conversation is more disturbing than helping[10]. A thorough research demonstrating the effects and difficulties of the use of digital communication tools on institutional works between different age-group workers may help the process of technology acceptance easier for every age-group.

3 METHOD

Everything is becoming technology dependent and physical communication has reduced a substantial amount and continues to reduce, which is causing more people to use digital means to communicate including institutions for academic purpose. Different age of people comprehend technology in different ways. Yet there has not been any concrete study on how age and technology relate based on the UI. This study will help us to investigate and answer the research question: How various age grouped people adapting and perceiving institutional work in digital communication platforms based on UI? This study also investigates the perception based evaluation of user experience components, i.e., pragmatic and hedonic product qualities and attractiveness, in relation to different visual elements.

3.1 Study Design

As mentioned, our hypothesis for this study is following:

H1: Comprehensive UI helps older people more than the younger people in terms of adaptability.

To achieve our goals, we selected one of the most effective method which is to create a questionnaire and conduct survey. The survey is shared with different age group of people with different professions to receive the feedback based on their assessment. Anyone with the link to the survey is allowed to fill out the survey form

and participate. Based on the responses, we developed a mock-up of the prototype with simple UI and effective features which can be useful and easy to use by, preferably, old generation people. A qualitative study with two-factorial between-subject design was carried out with the independent variable AGE. The dependent variables are PRAGMATIC QUALITY, IDENTIFICATION, STIMULATION, ATTRACTIVENESS, and ACCEPTABILITY.

3.2 Stimuli

The stimulus material consists of UI screenshots of various operations of 3 digital communication applications, Zoom, Microsoft Team and Google Meet, which some of the most popular communication platforms at present[4]. Followed by screenshots of each application, a structured set of questionnaire is presented. This included an AttrakDiff-mini section, a set of 7-point Likert-type scale measuring questions to evaluate how well participants accept each application, and open-ended question sections. The conditions were presented without any randomization.

Overall appeal of the system:		-3	-2	-1	0	1	2	3
	confusing							structured
	impractical							practical
	unpredictable							predictable
	complicated							simple
	dull							captivating
	tacky							stylish
	cheap							premium
	unimaginative							creative
	gross							best
	beautiful							ugly

Figure 1: AttrakDiff-mini questions

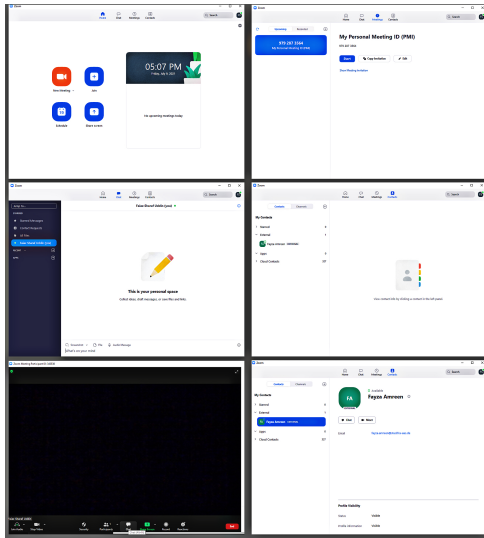


Figure 2: Screenshots of Zoom UI for different operations

3.3 Apparatus

For our research, we prepared questionnaires and created survey on Lime Survey, an online open source statistical survey application. The survey involved questions related to user understanding,

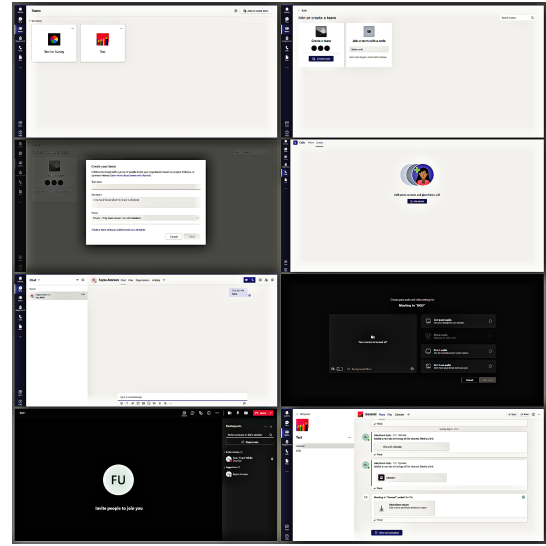


Figure 3: Screenshots of Microsoft Team UI for different operations

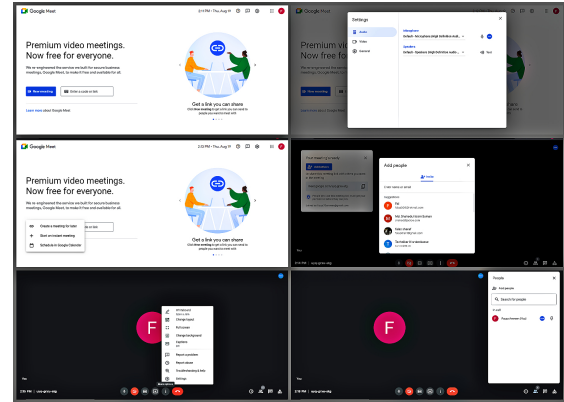


Figure 4: Screenshots of Google Meet UI for different operations

perspective, and views on online communication applications. The participants will fill out the survey presented to them.

3.4 Participants

The participants for survey were selected using email lists and social media platforms. Overall, 82 participants (Male = 41, Female = 38 and others = 3) completed the online questionnaire that reviewed three different digital communication applications based on their respective screenshot images. These participants were mostly students (35.37%), Teachers (20.37%), It-professionals (20.73%), Administrative personnel (6.10%) and other professions (17.07%).

Responses and demographic information were collected anonymously. The participation in the survey was done by completely voluntarily. No compensation was provided to the participants. The participants were given freedom to use their preferred device

(Desktop computer, Laptop and Mobile) for viewing the stimulus application pictures and answering the questionnaire. The screenshots were tested across multiple devices to see their clarity and consistency for the viewing of the participants.

3.5 Procedure

After giving informed consent, participants can access survey and start answering to the questions followed by questionnaires. At first there are demographic questions to collect participant's personal information. After answering the demographic questions, participants are presented with more specific questions. The questionnaires are mainly related to application usage from the prospective of the end user. Each questionnaire had three sections for each application: an AttrakDiff-mini section, a set of 10 7-point Likert-type scale measuring questions to evaluate how well participants accept each application, and 3 open-ended question section.

Participants evaluated the 3 different UIs of the 3 application using a version of the AttrakDiffmini questionnaire developed by Hassenzahl and Monk[5] presented as in Figure 1. This questionnaire was conducted using a semantic differential ranging from ugly (1) to beautiful (7). Using the modified AttrakDiff-mini questionnaire, participants evaluated each UI based on items such as pragmatic product qualities, identification, stimulation, and attractiveness.

After completing the AttrakDiff section of the questionnaire, participants rated 10 questions of 7-point Likert scale with anchors for extremes (1= Strongly Disagree, 7 = Strongly Agree), that indicates how well they accept each UI version. We measured "acceptability" by selecting fixed 5 questions and calculating their mean.

Finally, participants answered eight open-ended questions. Follow up questions were asked in relation to each 3 screenshots of each application: What is the one thing you liked the most about the application? What is the one thing you disliked the most about the application? If you could change one thing about the system, what would it be?

Each of the question in the survey was mandatory and after only answering all the question, participant could submit the form. The main aim of the survey is to understand and study UI of the applications according to participants point of view and how willing they are to use the application in future.

4 RESULT

The focus of this study was to investigate How various age grouped people adapting and perceiving institutional work in digital communication platforms based on UI. Participants did not interact with the applications; they only viewed screenshots different operations of 3 of the application.

We used a multiple analysis of variance (MANOVA) with repeated measurements. The analysis included AGE as independent variables, and PRAGMATIC QUALITY, IDENTIFICATION, STIMULATION, ATTRACTIVENESS, and ACCEPTABILITY as dependent variables.

The following effects are presented when analyzing for the application Zoom:

- PRAGMATIC QUALITY: F-value = 1.643 , p-value = 0.1587
- IDENTIFICATION: F-value = 0.4995, p-value = 0.7757

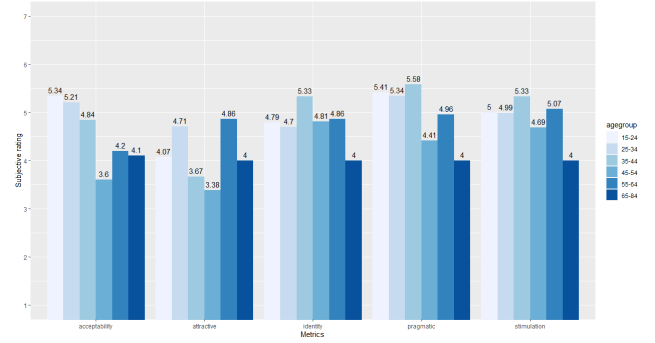


Figure 5: Zoom application: main effect of Age on UI components: pragmatic quality, identification, stimulation, attractiveness, along with accepting of the application. Semantic differential with 1 = negative and 7 = positive evaluation for subjective rating scales (pragmatic qualities, identification, stimulation, attractiveness) utilizing the AttrakDiff-mini questionnaire. Accepting measured by questions of 7-point scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree).

- STIMULATION: F-value = 0.5042, p-value = 0.7722
- ATTRACTIVENESS: F-value = 1.3661, p-value = 0.2465
- ACCEPTABILITY: F-value = 4.4313, p-value = 0.001353 **

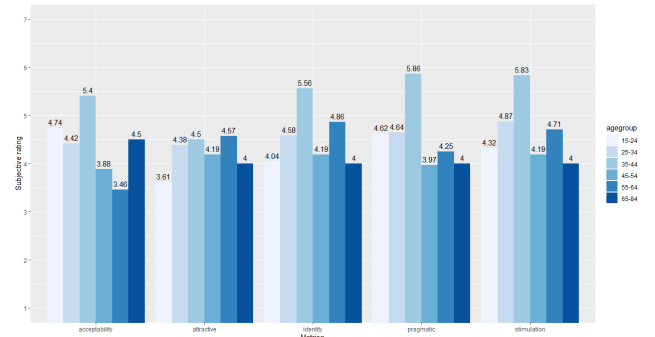


Figure 6: Microsoft Team application: main effect of Age on UI components: pragmatic quality, identification, stimulation, attractiveness, along with accepting of the application. Semantic differential with 1 = negative and 7 = positive evaluation for subjective rating scales (pragmatic qualities, identification, stimulation, attractiveness) utilizing the AttrakDiff-mini questionnaire. Accepting measured by questions of 7-point scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree).

The following effects are presented when analyzing for the application Microsoft Team:

- PRAGMATIC QUALITY: F-value = 2.1194, p-value = 0.0721
- IDENTIFICATION: F-value = 1.5685, p-value = 0.1791
- STIMULATION: F-value = 1.7406, p-value = 0.1355
- ATTRACTIVENESS: F-value = 0.5888, p-value = 0.7085

- ACCEPTABILITY: F-value = 2.2053, p -value = 0.06234

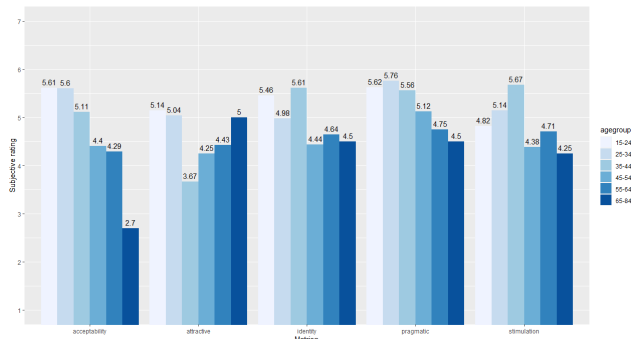


Figure 7: Google Meet application: main effect of Age on UI components: pragmatic quality, identification, stimulation, attractiveness, along with accepting of the application. Semantic differential with 1 = negative and 7 = positive evaluation for subjective rating scales (pragmatic qualities, identification, stimulation, attractiveness) utilizing the AttrakDiff-mini questionnaire. Accepting measured by questions of 7-point scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree).

The following effects are presented when analyzing for the application Google Meet:

- PRAGMATIC QUALITY: F-value = 1.1265, p -value = 0.3536
- IDENTIFICATION: F-value = 0.9606, p -value = 0.4474
- STIMULATION: F-value = 1.664, p -value = 0.1536
- ATTRACTIVENESS: F-value = 1.4916, p -value = 0.2025
- ACCEPTABILITY: F-value = 3.8197, p -value = 0.003857 **

5 DISCUSSION

In this paper, user experiences and preferences in relation to various age group for different digital communication applications contexts were studied. The results show that different elements contribute to experiential aspects of various applications.

Assessing the p -values from the data analysis of each of the applications, we can see that there has no significant effect of age on pragmatic qualities and hedonic qualities of the UI of these digital communication systems. When evaluating the impact of age on accepting each of the applications, we found that there are some significant effects of age in Zoom and Google Team but none in Microsoft Team.

Majority of the users would like to use the application, which is easy to operate and feasible to use. Many people talked about the security as the major aspects while choosing the application. The performance of the application played a major role in the selection. According to survey concluded, Google Meet is the most liked application by the participants according to the Efficient rate. Elderly people widely use mobile phones, but when it comes to use of communication platform the percentage of active user is small. As findings shows the most beneficial factor for people of different age groups in using applications are pragmatic qualities, liking, identification, stimulation, and attractiveness. Use of Microsoft

Team for communication was favourable only for 31% of users and for Zoom it was just 15% from the age group of 55-85. Hence, the user chose application based on their convenience most of the time. However, sometimes they are bound to use a particular application as per an organisation's rules.

6 CONCLUSION

Increase of usage of digital communication system arises the question of how different age grouped people perceive this system. This study evaluates the perception and acceptance of digital communication tools in terms of user interface among users of different age groups were studied. The users were subjected to questionnaire based on screenshot images of three (Zoom, Microsoft Team, Google Meet) different digital communication applications. The experimental results shows that age has some significant effect on acceptance of Zoom and Google Meet but the effect was not prevalent in Microsoft Team. On the other had age did not have any significant effect on the hedonic and pragmatic qualities of the UI. The study does not reflect a generalized perception of every age group and culture. Further studies need to be conducted with symmetric aged group participants.

LIMITATIONS

The experimental observations were conducted based on screenshot images only. The participants of the survey did not interact with the actual applications. So, a practical perception of the users or real-life scenarios were not considered. People of different cultures perceive visual images differently. Van Leeuwen and Kress, 2006[7] expressed that visual dimension can strongly be influenced by the cultural style of writing and reading direction. Most of the participants for the study were from Bangladesh (62.19%) so a universal assumption cannot be guaranteed. Besides, the participants representing different age groups were not symmetrical. More than 51% of the participants were from the age range 25 to 34. Furthermore, the participants may have previous experience or familiarity with the applications used in the survey. This could result in biased feedback from participants. Advance experiment must be conducted in such a way that, the participants are unbiased.

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REFERENCES

- [1] Ahmed Alsswey and Hosam Al-Samarraie. 2020. Elderly users' acceptance of mHealth user interface (UI) design-based culture: the moderator role of age. *Journal on Multimodal User Interfaces* 14, 1 (2020), 49–59. <https://doi.org/s12193-019-00307-w>
- [2] Michael T. Braun. 2013. Obstacles to social networking website use among older adults. *Computers in Human Behavior* 29, 3 (2013), 673–680. <https://doi.org/j.chb.2012.12.004>
- [3] Sara J Czaja, Neil Charness, Arthur D Fisk, Christopher Hertzog, Sankaran N Nair, Wendy A Rogers, and Joseph Sharit. 2006. Factors predicting the use of technology: findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychology and aging* 21, 2 (2006), 333. <https://doi.org/0882-7974.21.2.333>

- [4] Nicholas Hunter Gauthier and Mohammad Iftekhhar Husain. 2021. Dynamic Security Analysis of Zoom, Google Meet and Microsoft Teams. In *Silicon Valley Cybersecurity Conference: First Conference, SVCC 2020, San Jose, CA, USA, December 17-19, 2020, Revised Selected Papers*, Vol. 1383. Springer Nature, 3. https://doi.org/10.1007/978-3-030-72725-3_1
- [5] Marc Hassenzahl and Andrew Monk. 2010. The inference of perceived usability from beauty. *Human-Computer Interaction* 25, 3 (2010), 235–260.
- [6] Deborah S. Judge and Bethany Murray. 2017. Student and Faculty Transition to a New Online Learning Management System. *Teaching and Learning in Nursing* 12, 4 (2017), 277–280. <https://doi.org/10.1016/j.teln.2017.06.010>
- [7] G Kress and T Van Leeuwen. 2006. *The grammar of visual design* (2ndeds). London & New York: Routledge. Taylor Francis Group (2006).
- [8] Jennifer M Loglia and Clint A Bowers. 2016. Emoticons in business communication: Is the(;) worth it? In *Emotions, technology, and design*. Elsevier, 37–53. <https://doi.org/10.1016/B978-0-12-801872-9.00003-X>
- [9] Sarah Morrison-Smith and Jaime Ruiz. 2020. Challenges and barriers in virtual teams: a literature review. *SN Applied Sciences* 2 (2020), 1–33. <https://doi.org/10.1007/s42452-020-2801-5>
- [10] David Payne. 2018. The pros and cons of mentoring by Skype. *Nature* (Jul 2018). <https://doi.org/10.1038/d41586-018-05794-7>
- [11] Ramón Ventura Roque-Hernández, José Luis Díaz-Roldán, Adán López-Mendoza, and Rolando Salazar-Hernández. 2021. Instructor presence, interactive tools, student engagement, and satisfaction in online education during the COVID-19 Mexican lockdown. *Interactive Learning Environments* 0, 0 (2021), 1–14. <https://doi.org/10.1080/10494820.2021.1912112>
- [12] Mira Rubin. 2013. *Interactive InDesign* CC. Routledge, 513–522. <https://doi.org/10.4324/9780203385210-46>
- [13] Nada Sahlab, Laura Wiebelitz, Peter Schmid, Florian Reichelt, Nasser Jazdi, Michael Weyrich, and Thomas Maier. 2020. A User-Centered Interface Design for a Pill Dispenser. In *2020 IEEE 9th Global Conference on Consumer Electronics (GCCE)*. IEEE, 761–764. <https://doi.org/GCCE50665.2020.9291946>
- [14] Eleftheria Vaportzis, Maria G Clausen, and Alan J. Gow. 2017. Older Adults Perceptions of Technology and Barriers to Interacting with Tablet Computers: A Focus Group Study. *Frontiers in psychology* 8 (2017). <https://doi.org/fpsyg.2017.01687>
- [15] Inaam Khalaf Wafika A. Suliman, Fathieh A. Abu-Moghli, Arwa F. Zumot, and Manar Nabolsi. 2021. Experiences of nursing students under the unprecedented abrupt online learning format forced by the national curfew due to COVID-19: A qualitative research study. *Nurse Education Today* 100 (2021). <https://doi.org/j.nedt.2021.104829>