Investigating The Relationships Between The Usability Factors Of Telehealth 'Sehhaty' Application

Alharbi, Khaled Rakyan

Abstract:

Since more people in Saudi Arabia use telehealth applications on a regular basis, their usability is vital. The 'Sehhaty' application is one of the several smartphone applications that have made telehealth services available in Saudi Arabia. The factors affecting future application usage and user satisfaction must be evaluated in studies. The usability of the telehealth research survey was used to measure the usability of the 'Sehhaty' Application. As a result, the study provides compelling evidence that Perceived Usefulness was highly correlated with Ease of Use and [1]Learnability (r = .839, p < .001), Interface Quality was strongly correlated with both Ease of Use and Learnability (r = .848, p < .001) and Satisfaction (r = .860, p < .001), Interaction Quality had a moderate correlation with factors such as Usefulness (r = .729, p < .001) and Reliability (r = .837, p < .001), The Satisfaction factor was strongly correlated with all other factors, with correlation coefficients ranging from .819 to .870 (p < .001), indicating that satisfaction with the system is closely linked to perceived usefulness, ease of use, and interface quality. Moreover, this study indicated that there is a positive relationship between Usefulness factor and Satisfaction, and future use factors.

Keywords: *Usability, Interface Quality, Ease of use, Interaction Quality, and Satisfaction.*

1. Introduction

The Sehhaty app was created by the Saudi Ministry of Health and released in August 2019 with the intention of achieving certain national objectives pertaining to healthy living. The COVID-19 vaccination appointment scheduling and registration feature was added to the application in February 2021 (Hassounah et al., 2020). Saudi Arabian citizens can access health services using the Sehhaty application, an integrated health services software made for mobile devices. The user can access a variety of health services and information from various health sector organizations in the Kingdom. Among other factors, the usability of telehealth applications and patient satisfaction with them have an impact on their adoption rate. Improving healthcare outcomes and making it easier for all patients to receive medical services are becoming more and more important (Waqas et al., 2021). Therefore, a facilitator of successful telehealth services is required to give treatment and lessen the strain on patients and healthcare providers in order to evaluate the usefulness of telehealth services (Fung et al., 2020). Thus, further study is needed to determine how satisfied users and other factors are with telehealth applications (Kaliyadan et al., 2013). This study is conducted to investigate the correlations between the

Assistant Professor, department of Information Technology, Tabuk University, Tabuk, Saudi Arabia, (Correspondence Author), kh_alharbi@ut.edu.sa, ORCIDs:https://orcid.org/0009-0000-9791-4180

usability factors of telehealth 'Sehhaty' application in the Tabuk region in Saudi Arabia.

2. Literature reviews

There are previous related literature reviews. For example, the study by Dawood and Alkadi (2022) assessed the Sehhaty Application's applicability in the Riyadh area of Saudi Arabia during the COVID-19 epidemic. With an overall satisfaction rate of 76.36%, the survey demonstrates that consumers find the Sehhaty application acceptable. 68.87% of participants preferred in-person visits, despite 44.34% finding the Sehhaty application enjoyable (Dawood & Alkadi, 2022). Also, the study by Infarinato F et al. (2020), who evaluated the acceptability of the eWALL platform and its potential impact on health promotion and monitoring in people with chronic illnesses or age-related impairments. According to their assessment of Pearson's correlation coefficient, which ranged from 0.53 to 0.86, all of the technology acceptance factors had a significant positive correlation. Among these were favorable associations between perceived usefulness and elements associated with ease of use, ease of use and elements associated with intention to use, and perceived usefulness and intention to use (Infarinato et al., 2020). Another research by Criollo-C et al. (2021) found that quality criteria, like system and content quality, had a favorable effect on how useful a website was considered. Similarly, Qashou (2021) examined how e-learning systems are affected by the quality of the materials. He discovered that perceived utility is significantly impacted by this factor. According to Zhang et al. (2020), usability elements like utility and ease of use are significantly correlated with quality indicators. Additionally, Almaiah et al. (2022) used Pearson correlation analysis to assess how well quality metrics supported the usability of m-learning systems during COVID-19. They discovered that perceived utility and system quality factors, perceived utility and system quality factors, perceived utility and perceived ease of use, and perceived utility and ease of use with intention to use factors all had positive relationships. Also,the provider experience and satisfaction with a telehealth application (SEHHA) utilized in Saudi Arabia during the COVID-19 pandemic were assessed by Alsaleh MM, et al. (2021). They found that COVID-19 improved telehealth encounters for most physicians. Sixty-seven percent of the physicians expressed satisfaction with Sehha. However, the incapacity to deliver accurate medical evaluations was the most common perceived barrier among the professionals (Alsaleh et al., 2021). As well, Alharbi, A. et al. (2021) assessed the e-health (Seha) application in Saudi Arabia and discovered that there was a significant difference between users and non-users in terms of efficiency (only one visit needed for treatment), satisfaction with health services (users had a higher mean score than non-users), and ease of access to health services (app users had a higher mean score than non-users). Additionally, there was a substantial correlation between Seha app use and age, gender, location, and employment. The mean ratings for all three questions were significantly lower for users experiencing technical issues, suggesting a substantial correlation between technical difficulties and the three items (on efficiency, satisfaction, and access). They also came to the conclusion that Saudi Arabia's healthcare system was improved by the Seha application. Application users had a better overall health experience in terms of how simple they believed it was to obtain healthcare services, how happy they were with those services, and how effective the system was as indicated by the number of doctor visits required. Among the factors that appeared to influence app utilization were age, gender, usual source of care, and technical difficulties (Alharbi et al., 2021). According to Albaghdadi and Daajani (2023), patients older than 55 and those utilizing telemedicine services for the first time had a significantly higher chance of experiencing low satisfaction (odds ratio (OR) = 8.068, p = 0.011 and OR = 8.919, p = 0.005, respectively). Patient familiarity with telemedicine services had a significant impact on satisfaction levels, indicating areas that require attention in order for telemedicine to be successfully introduced and grown in Saudi Arabia. As well, a modified TUQ questionnaire was used in a prospective cross-sectional study by AlShareef S. and AlWabel, A. (2024) on members of the general public who had just

scheduled a virtual consultation with a Saudi healthcare provider. Participants were chosen from all around Saudi Arabia using convenience sampling between November 2023 and January 2024. They responded to the Telehealth Usability Questionnaire, which gathered data on (i) baseline demographics and virtual consultations, and (ii) telehealth service delivery and technology. 53.7% of the 916 participants were female, and their average age was 47.2 (14.1) years. More than half went to general care visits, while the remaining patients saw a range of hospital specialties. those who reported feeling less satisfied with their virtual sessions. Over 90% of those surveyed stated that they would prefer to make an appointment online rather than in person. More than 90% of respondents thought virtual visits were helpful and convenient, simple to use, reliable, and resulted in a positive therapeutic encounter. Approximately half of respondents had telephone consultations, and around a third had video chats through hospital-provided platforms; despite the technical difficulties, 97.4% of respondents expressed satisfaction with their remote consultation experience. Significantly younger respondents, city dwellers, specialized clinic visits, psychologist consultations, in-person meetings, and telephone consultations were among those who expressed dissatisfaction with their virtual consultations. These figures encourage the maintenance and expansion of telehealth, especially through video conversations, with the aid of educational initiatives (AlShareef & AlWabel, 2024).

 According to Galavi, Z. et al. (2023), there was a favorable correlation between any e-health service's utility and user pleasure. Compared to other services, social networks have a better correlation between user satisfaction and their usefulness. (P < 0.0001, r = 0.95). Hvalič-Touzery et al. (2020) found that user experience plays a critical role in patient engagement with home telehealth systems (THS). They tested a home telehealth system (THS) for five months with fifty-five patients who had diabetes, hypertension, or at least one chronic illness and found that user experience is a critical factor in patients' involvement with THS. Every individual in the non-probability sample was a member of a Slovenian community health center. Following a three-month trial period, the data was subjected to a multilinear regression model. Regardless of their frequency of THS use, control over health (PAM), or self-assessed physical and mental health (SF-12), patients with greater usability (TUQ) values had more positive psychosocial benefits of the home THS (PIADS-10) utilization. Additionally, the findings revealed no correlation between technology acceptance (SUTAQ) and psychological outcomes. Overall, the results demonstrate that user experience (UX) has a significant impact on how patients interact with a home telehealth system (THS). Additionally, Kim (2021) examined the elements that influence users' happiness with digital health care services and their opinions of its usefulness. Following the completion of the study, which covered 364 consumers of digital healthcare services in Korea, statistical analysis results were collected. According to the analysis's findings, perceived usefulness was positively impacted by social and personal influence variables but not by information quality elements. Additionally, it was found that personal influence factors and information quality factors affected usage satisfaction while social impact elements had no effect. The results suggest that, in the context of digital healthcare services, personal influence factors pertaining to the product or service's experience had a significant impact on perceived usefulness and use satisfaction, while social impact factors had an impact on perceived usefulness and information quality factors had a significant impact on use satisfaction. They found a positive association between perceived usefulness and use satisfaction, with perceived usefulness positively influencing use satisfaction at a level of 4.570 (p<.0001), suggesting that use contentment may be influenced by perceived usefulness of digital healthcare services (Kim, 2021).

3. Method
The quantitative research method was applied in this study. The steps of the research technique are depicted in Figure 1. First, the sample was chosen, and data was collected. Data analysis

was then conducted using the pearson correlation analysis to investigate relationships between the usability factors of telehealth 'Sehhaty' application. Next, locate the outcomes. Lastly, the study's discussion, conclusion, and recommendations for the future were presented. Because of its focus on computer-human interaction and frequent use in evaluating the usability of telehealth systems, the Telehealth Usability Questionnaire was adapted for the quantitative study (Hajesmaeel-Gohari & Bahaadinbeigy, 2021). The TUQ Questionnaire is separated into factors that are included ease of use and learnability, satisfaction, future use, reliability, usefulness, and interface quality, and interaction quality. Each factor contains three to four questions that measure participant agreement using a 5-likert scale (Hajesmaeel-Gohari & Bahaadinbeigy, 2021). From January to May 2024, users of the Sehhaty application in the Tabuk region were sent an online survey. Additionally, this study included convenience and snowball sampling approaches.
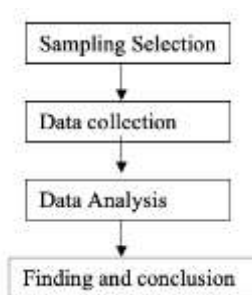

Figure 1. Quantitative Research Method

4. Validation and reliability

Two computer experts verified the study tool to make sure the questions were acceptable after being translated into Arabic. Cronbach's alpha was used to assess the scales' internal consistency. High reliability was demonstrated by all usability factors, indicating that the items in each component accurately gauge the desired usability attribute. In particular, the Cronbach's alpha values for usefulness, ease of use and learnability, interface quality, interaction quality, reliability, and satisfaction and future use were 0.88, 0.90, 0.89, 0.86, and 0.91, respectively. Strong internal consistency for every factor is indicated by these values.

5. Data collection procedure

Prior to data collection, the study tool underwent pilot testing, where two experts verified the appropriateness of the questions after they were translated into Arabic. A reliability test was then conducted using Cronbach's alpha. Following that, a survey was issued, and data was gathered using Google Forms and several social media platforms, including WhatsApp.

6. Results

The pearson correlation coefficients were calculated to examine the relationships between the six usability factors with 115 Participants that were 76.8 % male and 32.2% female. There were significant positive correlations among all factors. Usefulness factor was highly correlated with Ease of Use and Learnability (r = .839, p < .001), indicating that respondents who found the system useful also found it easy to use. Interface Quality was strongly correlated with both Ease of Use and Learnability (r = .848, p < .001) and Satisfaction (r = .860, p < .001), suggesting that the quality of the interface has a substantial impact on user satisfaction, and easy to use. Interaction Quality had a moderate correlation with factors such as Usefulness (r = .729, p < .001) and Reliability (r = .837, p < .001), suggesting that the quality of interactions influences perceptions of reliability and usefulness. The Satisfaction factor was strongly correlated with

all other factors, with correlation coefficients ranging from .819 to .870 (p < .001), indicating that satisfaction with the system is closely linked to perceived usefulness, ease of use, and interface quality.

The figure 2 shows the scatterplot that displays the relationship between Usefulness Total and Satisfaction Total scores. Each dot represents an individual respondent's rating for the two variables. As shown, higher Usefulness Total scores generally correspond to higher Satisfaction Total scores, indicating a positive relationship. This suggests that respondents who perceived the 'Sehhaty' application as more useful also tended to report higher levels of satisfaction. There are few outliers where high usefulness ratings do not correspond to high satisfaction ratings, indicating some variability in how usefulness impacts overall satisfaction. The system's usability lower, indicating a potential learning curve for new users.
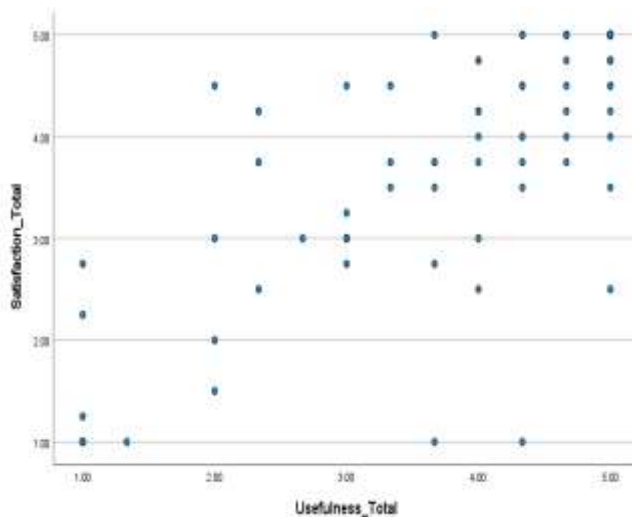

Figure 2. A relationship Between Usefulness Factor and Satisfaction Factor

7. Discussion

The results of this study indicates that there were the positive relationships between the usability factors. This finding is consistent with some previous studies. For instance, the study by Infarinato F et al. (2020), who assessed the eWALL platform's acceptability and possible effects for health promotion and monitoring in individuals with age-related impairments or chronic illnesses. All of the technology acceptance factors were substantially positively correlated, according to their evaluation of Pearson's correlation coefficient, which ranged from 0.53 to 0.86 where were positive correlations between Perceived Usefulness and ease of use factors, ease of use and intention to use factors and also, between Perceived Usefulness and intention to use factors. According to another study by Criollo-C et al. (2021), the perceived usefulness of a website was positively impacted by quality metrics, such as system and content quality. Similarly, Qashou (2021) looked into how e-learning systems were affected by the quality of the content. He discovered that perceived usefulness is significantly impacted by this component. Also, Zhang et al. (2020) suggested that there is a substantial correlation between usability factors, such as usefulness and ease of use, and quality metrics. Moreover, Almaiah et al. (2022), who evaluated how well quality metrics supported m-learning systems' usability at COVID-19 where they used pearson correlation analysis and found that there were positive relationships between ease of use and system quality factors, perceived usefulness and system quality factors, perceived ease of use and perceived usefulness, perceived ease of use and perceived usefulness with intention to use factors. Moreover, Alharbi, A. et al. (2021) assessed the e-health (Seha) application in Saudi Arabia and discovered that there was a significant

difference between users and non-users in terms of efficiency (only one visit needed for treatment), satisfaction with health services (users had a higher mean score than non-users), and ease of access to health services (app users had a higher mean score than non-users). Additionally, there was a substantial correlation between Seha app use and age, gender, location, and employment. The mean ratings for all three questions were significantly lower for users experiencing technical issues, suggesting a substantial correlation between technical difficulties and the three items (on efficiency, satisfaction, and access). They also came to the conclusion that Saudi Arabia's healthcare system was improved by the Seha application. Application users had a better overall health experience in terms of how simple they believed it was to obtain healthcare services, how happy they were with those services, and how effective the system was as indicated by the number of doctor visits required. Among the factors that appeared to influence app utilization were age, gender, usual source of care, and technical difficulties. According to Albaghdadi and Daajani (2023), patients older than 55 and those utilizing telemedicine services for the first time had a significantly higher chance of experiencing low satisfaction (odds ratio (OR) = 8.068, p = 0.011 and OR = 8.919, p = 0.005, respectively). Patient familiarity with telemedicine services had a significant impact on satisfaction levels, indicating areas that require attention in order for telemedicine to be successfully introduced and grown in Saudi Arabia. These results are consistent with the results of the current study.Usefulness factor with telehealth applications plays a crucial role in shaping user perceptions, particularly in areas such as satisfaction and future use. According to the current study, satisfaction and future use factor and usefulness factor have a favorable association. The study indicated the implication is that users who thought the 'Sehhaty' application was more helpful also tended to be more satisfied and use it again. This finding aligns with prior research suggesting that there is a positive relationship between Usefulness factor, and satisfaction and future use factor in telehealth application. For instance, Galavi, Z et al. (2023), found each e-health service's usefulness and satisfaction were found to be positively correlated. Compared to other services, social networks had a larger correlation between their usefulness and user satisfaction (r = 0.95, P < 0.0001). According to a study by Ohk et al. (2015) user satisfaction with mobile applications is positively impacted by usefulness. Additionally, user satisfaction has a significant impact on users' intentions to keep using mobile applications. Park and Ohm (2013) demonstrated that satisfaction and the intention to continue using health services were positively correlated. One aspect that had a substantial impact on the target user satisfaction was usefulness, according to a study by Koo et al. (2011). Moreover, Kim (2021) looked at factors that affect users' perceptions of the usefulness of digital health care services as well as their use satisfaction. Results from statistical analysis were obtained after the study, which involved 364 users of digital healthcare services in Korea, was completed. According to the analysis findings, perceived usefulness was positively impacted by social and personal influence variables, but not by information quality elements. Furthermore, it was discovered that whereas social impact factors had no effect on use satisfaction, personal influence factors and information quality factors did. The results suggest that, in the context of digital healthcare services, personal influence factors pertaining to the product or service's experience had a significant impact on perceived usefulness and use satisfaction, while social impact factors had an impact on perceived usefulness and information quality factors had a significant impact on use satisfaction. they discovered that use satisfaction may be impacted by perceived usefulness of digital healthcare services, and that there was a positive correlation between the two, with perceived usefulness having a positive impact on use satisfaction at a level of 4.570 (p<.0001).

8. Conclusion

The research emphasizes how crucial correlations are between the usability factors for successfully adopting the telehealth Sehhaty application in Saudi Arabia. The study provided the strong relationships between usability factors as a follow Perceived usefulness was found to be highly correlated with both ease of use and learnability ($r = .839$, $p < .001$); interface quality was strongly correlated with both ease of use and learnability ($r = .848$, $p < .001$) and satisfaction ($r = .860$, $p < .001$); interaction quality was moderately correlated with factors like usefulness ($r = .729$, $p < .001$) and reliability ($r = .837$, $p < .001$); and the satisfaction factor was strongly correlated with all other factors, with correlation coefficients ranging from .819 to .870 ($p < .001$). Additionally, this study showed a favorable correlation between satisfaction and future use factors and and usefulness components. The implication is that users who thought the 'Sehhaty' application was more helpful also tended to be more satisfied and use it in future. Additional factors that can affect user perceptions, such demographics or particular telehealth system functionalities, should be investigated in future studies. Future research should look at the factors that encourage and hinder the deployment of mobile health applications. A more thorough understanding of these factors can help maximize the usability and efficacy of telehealth systems.

References

1. Albaghdadi, A. T., & Daajani, M. M. A. (2023). Perceptions, Satisfaction, and Barriers to Telemedicine Use: A Community-Based Study from Jeddah, Saudi Arabia. Cureus. https://doi.org/10.7759/cureus.40738

2. Alharbi, A., Alzuwaed, J., & Qasem, H. (2021). Evaluation of e-health (Seha) application: a cross-sectional study in Saudi Arabia. BMC Medical Informatics and Decision Making, 21(1). https://doi.org/10.1186/s12911-021-01437-6

3. Almaiah, M., Hajjej, F., Shishakly, R., Lutfi, A., Amin, A., & Awad, A. (2022). The Role of Quality Measurements in Enhancing the Usability of Mobile Learning Applications during COVID-19. Electronics, 11(13), 1951. https://doi.org/10.3390/electronics11131951

4. Alsaleh, M. M., Watzlaf, V. J. M., DeAlmeida, D. R., & Saptono, A. (2021). EVALUATION OF a TELEHEALTH APPLICATION (SEHHA) USED DURING THE COVID-19 PANDEMIC IN SAUDI ARABIA: PROVIDER EXPERIENCE AND SATISFACTION. PubMed, 18(4), 1b. https://pubmed.ncbi.nlm.nih.gov/34975351

5. AlShareef, S. M., & AlWabel, A. A. (2024). Patient Opinions about Virtual Consultations in Saudi Arabia: A Nationwide Cross-Sectional Study. Healthcare, 12(10), 1001. https://doi.org/10.3390/healthcare12101001

6. Criollo-C, S., Lema, M., Gonzalez, M. S., Jaramillo-Alcázar, A., Guerrero-Arias, A., & Luján-Mora, S. (2021). Exploring the technological acceptance of a mobile learning tool used in the teaching of an indigenous language. PeerJ Computer Science, 7, e550. https://doi.org/10.7717/peerj-cs.550

7. Dawood, A. M., & Alkadi, K. S. (2022). Evaluating usability of Telehealth Sehhaty application used in Saudi Arabia during COVID-19. Studies in Health Technology and Informatics. https://doi.org/10.3233/shti220718

8. Fung, A., Irvine, M., Ayub, A., Ziabakhsh, S., Amed, S., & Hursh, B. E. (2020). Evaluation of telephone and virtual visits for routine pediatric diabetes care during the COVID-19 pandemic. Journal of Clinical & Translational Endocrinology, 22, 100238. https://doi.org/10.1016/j.jcte.2020.100238

9. Galavi, Z., Pourasad, M. H., Norouzi, S., Jahani, Y., & Khajouei, R. (2023). Public Usage, Perceived Usefulness, and Satisfaction with E-health Services in COVID-19 Pandemic. Journal of Clinical Research in Paramedical Sciences, 11(2). https://doi.org/10.5812/jcrps-133719

10. Hajesmaeel-Gohari, S., & Bahaadinbeigy, K. (2021). The most used questionnaires for evaluating telemedicine services. BMC Medical Informatics and Decision Making, 21(1). https://doi.org/10.1186/s12911-021-01407-y

11. Hassounah, M., Raheel, H., & Alhefzi, M. (2020). Digital response during the COVID-19 pandemic in Saudi Arabia. Journal of Medical Internet Research, 22(9), e19338. https://doi.org/10.2196/19338

12. Hvalič Touzery, Simona & Dolnicar, Vesna & Prevodnik, Katja & Škafar, M & Petrovcic, Andraz. (2020). The Importance of Patients' User Experience With a Telehealth System for Their Evaluation of its Psychosocial Impacts.

13. Infarinato, F., Jansen-Kosterink, S., Romano, P., Van Velsen, L., Akker, H. O. D., Rizza, F., Ottaviani, M., Kyriazakos, S., Wais-Zechmann, B., Garschall, M., Bonassi, S., & Hermens, H. J. (2020). Acceptance and Potential Impact of the eWALL Platform for Health Monitoring and Promotion in Persons with a Chronic Disease or Age-Related Impairment. International Journal of Environmental Research and Public Health, 17(21), 7893. https://doi.org/10.3390/ijerph17217893

14. Kaliyadan, F., Amin, T. T., Kuruvilla, J., & Ali, W. H. a. B. (2013). Mobile teledermatology – patient satisfaction, diagnostic and management concordance, and factors affecting patient refusal to participate in Saudi Arabia. Journal of Telemedicine and Telecare, 19(6), 315–319. https://doi.org/10.1177/1357633x13501778

15. Kim, J. L. B. (2021, November 29). THE EFFECT OF SERVICE INFLUENCE FACTORS ON PERCEIVED USEFULNESS AND USE SATISFACTION IN DIGITAL HEALTHCARE SECTOR. INTERNATIONAL JOURNAL OF ELECTRICAL ENGINEERING AND TECHNOLOGY (IJEET). https://iaeme.com/Home/article_id/IJEET_12_11_010

16. Koo, C., Wati, Y., Park, K., & Lim, M. K. (2011). Website quality, expectation, confirmation, and end user satisfaction: The Knowledge-Intensive Website of the Korean National Cancer Information Center. Journal of Medical Internet Research, 13(4), e81. https://doi.org/10.2196/jmir.1574

17. Ohk, K., Park, S., & Hong, J. (2015). The influence of perceived usefulness, perceived ease of use, interactivity, and ease of navigation on satisfaction in mobile application. Advanced Science and Technology Letters. https://doi.org/10.14257/astl.2015.84.18

18. Park, E., & Ohm, J. (2013). Factors influencing users' employment of mobile map services. Telematics and Informatics, 31(2), 253–265. https://doi.org/10.1016/j.tele.2013.07.002

19. Qashou, A. (2021). Influencing factors in M-Learning adoption in higher education. https://eric.ed.gov/?id=EJ1292309

20. Waqas, A., Mehmood, S., Jawwad, A. M., Pittam, B., Kundu, S., Correia, J. C., & AlMughamis, N. (2021). Telemedicine in Arab countries: innovation, research trends, and way forward. Frontiers in Digital Health, 2. https://doi.org/10.3389/fdgth.2020.610837

21. Zhang, X., Lo, P., So, S., Chiu, D., Leung, T., Ho, K., & Stark, A. (2020). Medical students' attitudes and perceptions towards the effectiveness of mobile learning: A comparative information-need perspective. https://hub.hku.hk/handle/10722/286377