

HEALTHCARE SCIENCES STUDENTS' PERCEPTIONS OF INTEGRATING DIGITAL HEALTHCARE INTO THE HIGHER EDUCATION CURRICULUM

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ABSTRACT

To ensure healthcare professionals excel in a digitally advanced healthcare landscape, they must receive proper training. This study aimed to evaluate the awareness and perspectives of Healthcare Sciences students from various disciplines at a South African higher education institution regarding the integration of digital healthcare into the curriculum. A descriptive quantitative research design was employed, with data collected via an online questionnaire addressing awareness, perceived benefits, and challenges related to digital healthcare curriculum inclusion. Out of 138 participants, 52.9 per cent (n=73) reported a poor understanding of digital healthcare, and 79.7 per cent (n=110) indicated they had not taken a digital health course during their training. A statistically significant correlation ($p=0.00$) was found between awareness and formal training, suggesting that poor awareness is linked to a lack of formal training. Participants identified the potential benefit of using digital healthcare platforms to open a practice after graduation. However, 55 per cent (n=76) expressed concern that digital healthcare training might

negatively affect cultural competence as a clinical skill. Health Sciences training institutions should integrate digital health skills into the core curriculum, emphasizing an experience-based approach. The curriculum should include patient interaction, cultural dynamics, standards and ethics, and technical skill development.

Keywords: Curriculum, digital healthcare, higher education institution, training

INTRODUCTION

The use of telecommunications and digital technologies in healthcare, collectively known as digital healthcare, is rapidly becoming an integral component of modern healthcare systems. It is reshaping clinical practice and significantly improving patient management (El Khatib et al. 2022, 563, Edirippulige et al. 2022, 258). This transformation is largely driven by advancements in digitalization, automation, and the global push toward modernizing healthcare systems, leading to increased efficiency (Kim et al. 2019, 6). Hence, student training in digital healthcare has become essential. Aungst and Patel (2020) stress that healthcare professionals must be adequately trained and prepared to navigate a healthcare landscape increasingly disrupted by technological innovations. The challenge, however, lies in effectively integrating digital healthcare concepts and training into healthcare sciences curricula.

The World Health Organization (2018) underscores the importance of preparing the healthcare workforce for digital proficiency, whether in clinical practice, health care operations, or health systems management. Despite the considerable progress made by some countries, many healthcare professionals, particularly in Africa, lack the essential skills needed to effectively utilize digital technologies (Alunyu et al. 2020, 38). Additionally, African nations are at varying stages of implementing digital health systems, and the full benefits of digital healthcare have yet to be achieved.

A digitally informed curriculum can equip healthcare professionals to integrate technology into treatment protocols, enhance patient-care interactions through technology, and be better prepared to address the healthcare needs of diverse populations. (Aungst and Patel 2020, 2). The assimilation of digital healthcare into the formal curriculum also creates an opportunity for interprofessional education opportunities. Students from different healthcare professions can interact in digital health discussions whilst working with a patient virtually to tackle health problems, bringing diverse and varied views together (Aungst and Patel 2020,2).

With technology exponentially growing and expanding, educators are tasked with the responsibility of ensuring that they are keeping abreast with recent trends in digital health care and recent innovations (Aungst and Patel 2020, 3). Developing a comprehensive curriculum can be challenging due to the fast-evolving nature of technology (Kim et al. 2019, 3). This,

coupled with concerns about diminishing core clinical skills, a shift away from a universal approach to healthcare. (Zainal et al. 2023, 1) and experiential education, such as reduced participation in clinicals where students can apply and integrate their knowledge⁴ may posit as a challenge to implementing digital health into curricula.

Utukuri et al. (2022) found that digital healthcare training is often overlooked in both undergraduate and postgraduate health curricula. In South Africa, the problem is made greater by the decreased opportunities for education in digital health with most courses available only at the post-graduate level. Furthermore, in South Africa, the challenge is exacerbated by limited educational opportunities in digital health, with most courses offered only at the postgraduate level. Although some institutions provide digital healthcare training in various forms, the implementation and uptake have been inconsistent (Alunyu et al. 2020, 38). Additionally, across Africa, digital health training programs often suffer from inadequate basic competencies and a lack of cohesive curriculum design.

Evidence in the literature highlights the need for digital healthcare training and its implementation, as recognized by learners, educators, and professionals (Poncette et al. 2020, Holland Brown and Bewick 2023). Therefore, it is crucial to incorporate core modules on digital health into the health sciences curricula. Incorporating telerehabilitation into higher education curricula in South Africa could enhance its recognition as a viable healthcare delivery model and provide students with essential skills for this field (Mbunge et al. 2019). The advantages and favourable clinical outcomes of digital healthcare will motivate health science programs to integrate this content into their curricula. However, while opportunities are abundant, there may be a lack of faculty development and experts to deliver these learning experiences on a large scale (Aungst and Patel 2020).

Unfortunately, the absence of a standardized digital health curriculum across the African continent can result in fragmented and disjointed development of digital health skills within the workforce (Alunyu et al. 2020, 34). Therefore, a comprehensive curriculum is needed to guide the training of health workers, ensuring they acquire the necessary competencies to effectively implement, operate, and utilize eHealth technologies (Alunyu et al. 2020, 34).

The World Health Organization (2021) recommends that each country formulate its own strategy for integrating digital healthcare into healthcare professionals' training programs and emphasizes the importance of including all stakeholders in this process. Students, as key stakeholders in curriculum development play a crucial role (Matkovic et al. 2014). Engaging students allows for valuable recommendations, critiques, and feedback, ensuring that the curriculum effectively addresses the country's healthcare needs.

There is substantial evidence supporting the use of digital healthcare services to enhance patient care across various health professions, including nursing, physiotherapy, dentistry, medicine, speech-language pathology, and audiology among others. Including digital healthcare in the curriculum is essential for student training. However, in South Africa, there is limited information on which aspects of digital healthcare are addressed in both theoretical and practical training, as well as on students' perspectives regarding its incorporation into the curriculum. This study aims to assess the awareness and views of Healthcare Sciences students at a South African higher education institution about integrating digital healthcare into their curriculum.

METHOD

Aim

The study aimed to determine the awareness and perceptions of healthcare sciences students at a higher education institution in South Africa (SA) regarding the integration of digital healthcare into the curriculum.

Research design

The study employed a quantitative research methodology with a prospective, cross-sectional descriptive survey design (DeFranzo 2011). A descriptive survey design was utilized to gather extensive data from a diverse group of individuals (DeFranzo 2011). An electronic questionnaire distributed through Google Forms was used to collect data, enabling researchers to gather responses from multiple disciplines across the University. This method of data collection has been previously used with success in the higher education South African context in the field of healthcare (Knight, Van Wyk and Mahomed 2016).

Participants and sampling

Total population sampling was implemented to ensure that every individual in the sample had an equal opportunity to participate and to allow for generalization of the findings (Knight, Van Wyk and Mahomed 2016). A statistician was consulted. Using a 95 per cent confidence level, a 50 per cent response distribution, and a 5 per cent margin of error, a minimum sample size of $n=100$ was recommended.

A total of 103 participants completed the online survey across five departments in the school of health sciences at a higher education institution, i.e. Speech-Language Pathology and

Audiology (n=14), Nursing sciences (n=36), Dietetics and Nutrition (n=17), Physiotherapy (n=18) and Occupational therapy (n=18). Twenty-five percent (n=35) were male and 75 per cent (n=103) were female. Ninety-seven percent of participants were Black, while 3 per cent were White, Indian, or Coloured. The participants' ages ranged from 21 to 31 years, with a mean age of 23.5 years.

Data instrument and collection

The questionnaire used in the study was developed according to the objectives of the study. The questionnaire was adapted from a similar study conducted by Thapa, Bhandari and Pathak (2021) in Nepal, which focused on nursing students. The current questionnaire comprised thirty-four closed-ended questions, divided into three sections. The first section gathered demographic information, the second assessed students' awareness of digital healthcare, and the third explored their perceptions on digital healthcare. A pilot study was conducted with ten third-year students from the School of Healthcare Sciences at the selected institution. Based on feedback, the questionnaire was revised to improve user-friendliness, including adjustments to question numbering and order.

The final questionnaire was distributed via Google forms and the consent form accompanied the questionnaire which explained the purpose and nature of the research. All participants provided consent and then had access to the questionnaire. participants an additional week to complete the survey.

DATA ANALYSIS

The research data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 25. Coded data were analyzed descriptively, focusing on frequency and percentage distributions. Non-parametric inferential statistics were used to explore potential relationships between variables, including the chi-square test for association to examine relationships between categorical variables, such as the level of awareness of digital healthcare training and formal training. Chi-square statistics were employed to assess the significance of these relationships. Descriptive statistics were used to analyze demographic data and response percentages. A p-value of less than 0.05 was considered significant.

PROCEDURE

Ethical permission to conduct the study was granted by the University Research Ethical Committee. The ethics reference number was SMUREC/H/181/2022: UG. Permission was obtained from the various Heads of Departments. Prior to data collection, participants were informed about the study's purpose, their voluntary participation, and their right to withdraw from the study at any time without facing any consequences (Grove et al. 2012).

RESULTS

A total of 138 participants completed the online survey. Among them, 25 per cent (n=35) were male and 75 per cent (n=103) were female. Ninety-seven percent of participants were Black, while 3 per cent were White, Indian, or Coloured. Participants' ages ranged from 21 to 31 years, with a mean age of 23.5 years. All participants were in their final year of study. The distribution across different disciplines is shown in Figure 1 below.

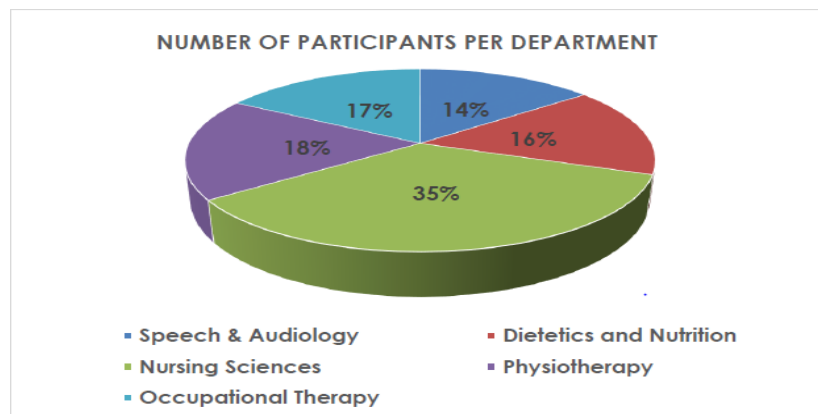


Figure 1: Participant distribution per discipline

Regarding participants' understanding of digital healthcare, 47.1 per cent (n=65) reported having a good grasp of the concept, while 52.9 per cent (n=73) indicated that their understanding was poor. Participants' responses about their familiarity with the different components of digital healthcare are presented in Table 1 below.

Digital healthcare component	Familiar	Unfamiliar
Telehealth services	65.9% (n=91)	34.1% (n=47)
Artificial intelligence services	21.7% (n=30)	78.2 % (n=108)
Electronic Health records (EHRs)	55.8% (n=77)	44.3% (n=61)
Electronic medical records (EMRs)	65.2% (n=90)	34,8% (n=48)
Wearable devices	30.5% (n=42)	69,6% (n=96)

Regarding completion of a student training module in digital healthcare, only 20.3 per cent (n=28) reported having completed some content related to digital healthcare. However, students indicated that the module did not address all the components listed in Table 1. When asked whether the COVID-19 pandemic increased their awareness of the need for digital healthcare platforms in student training, 64.5 per cent (n=89) agreed that the pandemic had heightened their awareness of digital healthcare.

In terms of their level of awareness relating to their competence, 63.7 per cent (n=88) felt incompetent to use digital healthcare technologies and modalities as they stated that their knowledge is poor. A significant relationship ($p=0.00$) was found between the perceived low level of awareness and exposure to formal digital healthcare training, indicating that poor awareness is directly associated with a lack of formal training. Participants were also asked to indicate their level of awareness regarding the university's resources relating to digital healthcare training and 65.2 per cent (n=90) had concerns that the University was ill prepared to train students in digital healthcare.

Participants agreed on the necessity of including digital health in the curriculum, with 62.4 per cent (n=86) supporting this view. Additionally, 40.5 per cent (n=56) believed that digital healthcare training should be a key outcome for students, as it would enhance their educational benefits and expertise in a technologically advancing healthcare system. A significant relationship ($p=0.00$) was found between students' perceptions on digital healthcare competence as an exit-level outcome and an increased confidence and willingness to work within digital healthcare practices. This suggests that students' readiness to incorporate digital healthcare into their practice is strongly linked to the need for comprehensive training in this area as a core outcome.

Sixty percent (n=82) felt that training in digital healthcare would allow them to be more globally competent, thereby increasing their eligibility to work abroad. Participants were asked if data security and privacy issues could be a potential challenge to them training within a digital

healthcare space. Seventy percent (n=96) agreed that data and privacy issues could pose a challenge. Participants were asked if they perceived that digital healthcare training would negatively impact their clinical training skills in terms of patient and professional interaction, 22 per cent of participants (n=31) did feel that it would impact their clinical skills in terms of patient and professional interaction and 40,3 per cent (n=55) were uncertain about the impact of digital healthcare on patient interaction.

Regarding the perceived impact of digital healthcare on community engagement, 33 per cent (n=45) of participants did not believe that introducing digital healthcare training would negatively affect their exposure to community engagement. Conversely, 76 per cent (n=105) were either uncertain or disagreed about this potential impact. Participants were asked about their views on whether developing cultural competence as a healthcare professional might be negatively affected by digital healthcare training. A total of 55 per cent of the participants (n=76) thought that cultural competence as a clinical skill could be negatively impacted through digital healthcare training ($p=0.01$), 7 per cent (n=9) did not perceive this to be a challenge and 38 per cent (n=53) was uncertain. Participants were also asked if they believed that a lack of professional standards and guidelines for digital healthcare could negatively impact the quality of digital healthcare training. A significant portion of the sample (82.6 per cent/n=114) perceived the lack of professional standards and guidelines as a challenge to the quality of training that they will receive via digital healthcare.

DISCUSSION

Given the proliferation of healthcare technology in the healthcare industry, Digital healthcare has the potential to improve healthcare and is especially beneficial for patients residing in remote and under resourced areas. Digital healthcare technology is also useful for keeping medical records of patients and the subsequent analysis of this data so that we can get a better understand of the population's health (World Health Organization 2021). It is therefore important that healthcare professionals are capacitated with the necessary skills to offer healthcare via digital technologies (Wong et al. 2021). Brown and Bewick (2021) mention that that digital healthcare training can improve the utilisation and sustainability digital healthcare programs. According to Hayat et al. (2021), healthcare professionals are insufficiently exposed to aspects of digital healthcare in their training.

It is imperative the digital healthcare competencies be harnessed during the training of healthcare professionals (Car et al. 2021). To this effect, many countries have tried to include such concepts into their curriculum (Car et al. 2021). however, diversifying and expanding the

healthcare sciences curriculum particularly within the South African context has been passive. For a truly transformed curriculum, it is worthwhile to assimilate the views of different stakeholders. This will ensure that the curriculum is reflective of the local healthcare context whilst still meeting global and professional standards.

Among the various stakeholders that should be involved in curriculum development, students are perhaps the most valuable as the end users of the curriculum information (Matkovic et al. 2022). Therefore, the research study focused on engaging with the perspectives of students regarding digital healthcare and its inclusion into their training. The salient findings indicated that the majority of students that participated in the study felt incapable to use digital healthcare technologies in the management of patients. This was largely attributed to their insufficient knowledge relating to digital healthcare. A significant correlation was found between the level of awareness of digital technology and formal training in digital healthcare. This was attributed to the training and education received.

The development of digital healthcare competencies through knowledge acquisition, skills training as well harnessing the appropriate attitudes relating to digital healthcare is central to effectively growing healthcare professionals (Stein 2016). Findings further allude to the fact that since the Covid-19 pandemic, students have realised the need to be trained and developed in digital healthcare. This finding is similar to that of other studies (Akintunde et al. 2021). More than fifty percent of the participants stated that their training institution do not have the relevant resources to sufficiently deliver education and training in digital healthcare (Al-Balas et al. 2020, Manteghinejad and Javanmard 2021). Participants expressed that inadequate resources at the institution should not be a barrier to receiving digital healthcare training and students suggested that at the least, theoretical exposure can be offered.

Majority of the students indicated that digital healthcare training should be an exit level outcome as that would both increase their educational benefits and increase their expertise to work in an advancing technological healthcare space. Similar findings were described by Edirippulige et al. (2022). According to Chen and Banerjee (2020) there are a continuum of educational benefits from digital healthcare training including agility, adaptability, leadership and management. There was a strong correlation between digital healthcare as an exit level outcome and willingness to practice in digital healthcare. This implied that participants were in support of exiting the program with well-rounded understanding and skills around digital healthcare. Hege et al. (2020) emphasized that intensive skills training and prioritization of digital healthcare training is imperative to ensure a capable health workforce. Participants also indicated that one of the benefits of digital healthcare training would be the entrepreneurial opportunities associated with having obtained digital healthcare training. This was a unique

finding in the current study as none of the current published studies outlined student perceptions relating to the entrepreneurial benefits of undergoing digital training. Khandelwal, Kolte and Rossi (2022) states that competency and skills in digital healthcare enhances entrepreneurial opportunities for healthcare professionals.

Data, security and privacy issues were described by most participants as a perceived challenges to the inclusion of digital healthcare into the curriculum. Similar findings were described by Dederichs et al. (2021) and Aungst and Patel (2020). Students highlighted concerns regarding the privacy of their own information as well as their patients and patient reports as they deliver services via digital platforms. Majority were uncertain as to whether digital healthcare training would negatively impact on their exposure to face-to-face patient interaction. Meaningful communication is an important aspect of healthcare service delivery (Jiang 2020, 324) In a study by Tates et al. (2017) both patients and practitioners reported no differences between online and face to face interaction in terms of communication, relationship building, and shared decision-making. Jiang (2020) found that patient centred communication is key to ensuring the success of online interaction. Although participants in the present study raised concerns about the perceived negative impact of patient interaction by introducing digital healthcare into their training, evidence suggests that communication is effective via online platforms provided that students are taught about the importance of patient centred communication. This will therefore be an important inclusion into the digital healthcare curriculum. Community engagement was another aspect that participants indicated may be negatively impacted by digital healthcare training. Durrance-Bagale et al. (2022) expresses that community engagement is central and imperative to any healthcare initiative and its success is highly dependent on health programs that value community participation. Tan et al. (2022) studied how digital technology can facilitate and strengthen community engagement. The researchers found that digital approaches to community engagement could enhance equity and improve health outcomes provided that those within the community are given equal and fair opportunity to participate despite their socio-economic status. This provides opportunity for the digital healthcare curriculum to include a digital community engagement framework so that students can be trained appropriately.

Almost half of the study sample were concerned that their development in cultural competence may be negatively impacted by doing online digital healthcare training. Truong, Paradies, and Priest (2014) describes cultural competency as an ability to leverage interventions to improve service delivery to racial/ethnic minority groups in the community with the intention of reducing health disparities. Students were concerned that digital healthcare may miss these minority groups due to poor access to technology. This may in turn reduce student exposure to

develop these cultural competences. There is very little published information on this aspect and more empirical research is required to determine if the development of cultural competence is negatively impacted when conducting digital healthcare technologies.

Participants expressed their concerns in the lack of guidelines and standards in digital healthcare and this related impact on the inclusion of digital healthcare in the curriculum. This finding was similar to that of Thapa et al. (2021). Thapa et al. (2021) conducted a study into the willingness of healthcare professionals to use digital health tools and it was found that whilst professionals were keen to use digital healthcare in patient care, they were concerned about the lack of standards and policies to guide their practice. In a study conducted by Abernethy et al. (2022) and Argent, Daly and Caulfield (2018) it was stated that development of standards will have to be included in the curriculum to better standardize clinician's behaviour and professionalism. It is evident that Universities need to focus on expanding their teaching and learning policy to include that of digital healthcare. Issues into how students will be assessed, protected and supported in terms of online patient management is important. This would also imply that regulatory bodies guiding the various disciplines need to be consulted regarding professional standards and guidelines for student training in digital healthcare.

CONCLUSION

The current research demonstrates that there is a growing need for digital healthcare education, which students recognize as a need to their professional development. As a result, healthcare institutions' curricular should include required content and clinical training relating to digital health. This research study offered fresh perceptions on the perspectives of undergraduate healthcare students on digital healthcare and its inclusion into the curriculum.

Health Sciences training institutions should incorporate digital health skills into their core curriculum since these are necessary competencies and attributes for practitioners to be prepared for the future. Rather than simply providing understanding of technical details, digital health education should aim to develop a critical, experience-based approach by managing patients on digital healthcare platforms.

RECOMMENDATIONS FOR FUTURE RESEARCH

A digitally enhanced healthcare curriculum should be considered and ideally include the development of standards and guidelines along with the development of technical skills. A

focus within this digitally enhanced curriculum toward patient and professional interaction, cultural dynamics and ethics should be key learning outcomes.

CONFLICT OF INTEREST

None

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