DOI: 10.7860/JCDR/2024/65912.19079

Research Protocol

Education Section

Evaluation of the Extent of Digital Divide among the Teachers in Healthcare Profession from Central India: A Research Protocol

ANJALI BHOYAR[1], SUNITA VAGHA[2], VEDPRAKASH MISHRA[3], SEEMA SATHE[4]

ABSTRACT

Introduction: Information and Communication Technology (ICT) has played a substantial role in the delivery of education. Despite the fact that technology-mediated interventions open up new avenues for health information dissemination and service delivery, there is concern that a knowledge gap, known as the digital divide, may exist.

Need of the study: In order to properly use technology and assist learners, educators must have technical abilities. Evidence from the literature suggests that educators lack the knowledge and skills required for ICT, leading to a digital divide. However, there is a dearth of data pertaining to the domains of the digital divide among healthcare educators in Central India.

Aim: The observational study is designed to evaluate the status of the digital divide among healthcare educators in Central India.

Materials and Methods: The cross-sectional study will be conducted at Sharad Pawar Dental College and Hospital, along with the School of Health Professions Research in Wardha, Maharashtra, India. Permission will be obtained from Institutional Ethical Committee, Datte Meghe Institute of Higher Education and Research (DMIHER) Deemed to be University (DU), over a period of two years spanning from July 2023 to June 2025. A minimum of 97 participants, comprising teachers from the healthcare profession in Central India, will participate in the survey to evaluate the status of the digital divide amongst healthcare educators in Central India.

Keywords: Education, Health professions, Information and communication technology, Online teaching

INTRODUCTION

The spread of Coronavirus Disease-2019 (COVID-19) in recent years has posed a threat to the human race. When the virus first appeared, traditional educational methods were surpassed by E-learning, as social gatherings at educational institutions were viewed as a potential source of virus transmission. The COVID-19 pandemic led to a technological transformation in the modalities of learning at educational institutions. Consequently, this emergency, brought on by the epidemic, led to innovations in higher education being implemented in a matter of days, which would normally take years to develop due to various management restrictions [1].

The ICT has played a substantial role in the delivery of education. It has been successfully applied in instruction, learning, and assessment. ICT is considered a powerful tool for bringing about changes in education. ICT includes computers, the internet, and electronic delivery systems such as radios, televisions, and projectors, among others, and is widely used in today's education field. Despite the fact that technology-mediated interventions open up new avenues for health information dissemination and service delivery, there is concern that a knowledge gap may exist between those who have access to digital technology and those who do not - a phenomenon known as the "digital divide" [2]. Scientists and specialists in the field of health education have been urged to advocate for expanded functional internet access and to acknowledge the addition of digital technology as a necessary component of general well-being [3,4].

Although improved accessibility to digital technology is important in health education from a futuristic perspective, improving an individual's internet awareness about health data, accessibility may not be ample. Instead, to improve health information processing, access to digital technology and the ability to retrieve information is required [5]. Fu JS discussed some external and internal factors that influence ICT use in education. He stated that there has been meager research into the possible relationships between external and internal variables, and how these relationships differ according to the variables involved in ICT integration. Examining these relationships could not only help teachers, students, and administrators understand the challenges of ICT use, it could also assist them in uncovering other solutions to overcome the existing barriers based on the relationships among different variables [6].

There is a dearth of data pertaining to the domains of the digital divide among healthcare educators. Also, there are many initiatives undertaken by the Indian Government and universities in India regarding the inclusion of ICT in teaching, learning, and training. However, specific focus on healthcare education and training is lacking.

The central region of India is known as the heart of India. The states of Maharashtra, Madhya Pradesh, and Chhattisgarh loosely constitute the central part of India. It has many institutes engaged in teaching and learning in the healthcare Sectors; Utilising ICT for knowledge delivery. The present research protocol describes an innovative study to find out the status of the digital divide among the healthcare educators in Central India, utilising the FICTA scale to identify grounds of the digital divide. Based on the preliminary findings, the issues of the digital divide shall be addressed by developing a comprehensive module in the form of a faculty development program, which can be taken up for capacity building to bring about fruitful digital literacy. Therefore, this research project aims to achieve this goal.

The present research protocol aims to answer the following research questions:

Research questions:

I. What is the extent of the digital divide among teachers in the healthcare profession in Central India?

II. If there is a perceptible digital divide among teachers in the healthcare profession, is there a need to develop a tool to

assess the digital divide among the teachers in the healthcare profession by modifying the existing FICTA scale (Faculty's ICT access) suggested for higher education faculty members?

III. Is there a need to develop a module to bridge the digital divide amongst teachers in the healthcare profession effectively?

The objectives of the study are:

Primary objectives:

1. To evaluate the extent of the digital divide amongst the teachers in the healthcare profession from Central India using the FICTA scale, which is used to assess the digital divide among higher education faculty.
2. If Yes, to ascertain the reasons for the digital divide among the teachers in the healthcare profession.

Secondary objectives:

I. To develop and validate the tool for the assessment of the digital divide addressing various domains such as desirability, availability of digital devices, digital abilities, and procedural access to ICTs by adapting the FICTA scale to healthcare education.

II. To evaluate the utility of the tool for the assessment of the digital divide.

REVIEW OF LITERATURE

Bingimlas KA conducted a meta-analysis of relevant literature aiming to present the perceived barriers to technology integration in science education. Their findings indicated that teachers had a strong desire to integrate ICT into education, but they encountered many barriers such as lack of confidence, lack of competence, lack of access to resources, and lack of technical support [7].

In a literature review conducted by O'Doherty D et al., the challenges and solutions encountered by educators while developing and employing online learning programmes for medical graduate and postgraduate trainees were determined. The authors emphasised that inadequate digital skills of the instructor can be a barrier to effective E-learning. Institutional assistance and training are needed to overcome this barrier. Medical educators need to obtain a thorough understanding of online platforms and technologies [8].

Matthews B conducted research to determine the scope of current worldwide studies on digital literacy pertaining to curricula on health education. The studies were chosen based on the relevance of digital literacy in pre-registration professional health education courses. According to present study, the educator's digital literacy could be a factor contributing to existing digital literacy gaps and a deficiency of curricular content [9].

While using digital technology for health education, the phenomenon of the digital divide must be taken into consideration in terms of the accessibility to digital technology and the knowledge and skills required in using the digital devices. Bernhardt JM stated that "Working to close the digital divide is one issue, but that should be addressed through research and the appropriate application of health education theories, models, principles, and core values" [3]. Stellefson M et al., specified that significant disparities in technology use in health education exist. They advocated prospective research to identify the extent and prospective gaps in technology utilisation to minimise the gap [2].

A scale was created by Soomro KA et al., to assess various aspects of the digital divide among teachers in higher education. The 57-item FICTA scale (Faculty's ICT access), according to the authors, had strong reliability and adequate validity to explore the topic of the digital divide among higher education faculty [10].

MATERIALS AND METHODS

The present cross-sectional Survey shall be carried out at Sharad Pawar Dental College and Hospital along with School of Health Professions Research, Datta Meghe Institute of Higher Education and Research (Formerly Known as Datta Meghe Institute of Medical Sciences), Sawangi (M) Wardha, Maharashtra, India over a period of two years spanning from July 2023-June 2025 as a doctoral research project.Permission from Institutional Ethical Committee, DMIHER was obtained vide letter No DMIMS/IEC/2022/845 Dated 05/04/2022.The research shall be aimed to evaluate the extent of digital divide amongst the teachers in healthcare profession from Central India using FICTA scale.

The study population will involve the teachers from Healthcare profession from Central India covering cities like Wardha, Nagpur, Amravati, Akola etc., The participants shall be selected randomly who shall consent to participate. The inclusion and exclusion criteria are as follows:

Inclusion criteria: Faculty members of all age groups/cadres from the disciplines of Medicine, Dental Sciences, Nursing Sciences, Ayurveda, Pharmacy, Physiotherapy from Central India who will be willing to participate in the study.

Exclusion criteria: Faculty members who shall not consent to participate in the study.

Sample size calculation: Minimum sample size required for evaluation the extent of digital divide amongst the teachers in healthcare profession.

Formula:

$$N= \frac{Z^2_{1-\alpha/2} * p*(1-p)}{D^2}$$

$Z_{1-\alpha/2}$=1.96, at 5% level of significance

Percentage of extent of digital divide amongst the teachers in healthcare profession=50% (Estimated).

P=50%

D=estimated error (10%)=0.10

$=((1.96)^{2*}(0.5)*(1-0.5)/(0.10)^2=97$

Minimum sample size required 97;

For development and validation of Modified FICTA scale:

Considering the intraclass correlation (ρ=0.85) estimated, between two module (Standard and Proposed).

$$n\geq 1+ \frac{2Z^2_{1-\frac{\alpha}{2}} (1-p)^2[1+(k-1)]p^2}{k(k-1)d^2}$$

α: Type I error=0.05

β: Type II error=0.2

Estimated Intraclass correlation coefficient (p): 0.85

Number of raters: 2

z=1.96

$$N= \frac{2*1.96^2(1-0.85)^2[1+(2-1)(0.85)^2}{2(2-1)(0.05)^2}$$

Total number of sample = 60

Ho: ρ≠0.85

H1: ρ>0.85

Total number of 60 samples shall be required to meet the objectives

Study Procedure

The participants' informed consent shall be obtained. The Information and Communication Technology Access (FICTA) scale for faculty members – The 57-item FICTA measure will be used to identify the parameters and reasons of the digital divide among healthcare educators during the survey to investigate faculty access to ICT on four levels: motivational, physical, skills, and usage access [10]. A Google form shall be prepared using the FICTA scale to obtain the feedback of the participants.

Based on the findings of the preliminary investigation, the FICTA scale will be further adapted for a specific application in healthcare to develop a tool to evaluate the digital divide amongst the healthcare professionals. The tool shall be validated as described below:

- Developing a draft tool by adapting the FICTA scale.
- Pilot testing of the tool.
- Revising the tool according to pilot tests.
- Validation of the tool.

The utility of the adapted FICTA scale will be tested for its accuracy to be used as an instrument to evaluate the digital divide among teachers from the healthcare profession by administering the tool to participants from a healthcare background.

STATISTICAL ANALYSIS

For the primary objective, all the results will be calculated using STATA software.

For primary objective: Descriptive statistics will be performed for key outcome variables. For categorical data, counts and percentages will be used, while for continuous variables, measures such as mean and Standard Deviation will be utilised. Prior to conducting test statistics, normality of the data will be tested using the Kolmogorov-smirnov test. T-tests, Analysis of Variance (ANOVA), and Chi-square tests will be used to describe and evaluate differences among different health educators. Non parametric tests such as the Wilcoxon-sign test and Kruskal-wallis test will be used for finding significant differences over ordinal data.

Assessment over the outcome variables at different domain:

(i) Physical access will be described and tabulated with frequency and percentage. The significance of differences in physical access will be determined using Chi-square analysis at a 5% level of significance ($p \leq 0.05$).

(ii) Endogenous motivational access, exogenous motivational access, operational skills, informational skills access, strategic skill access, general usage access, and instructional usage access will be assessed using a 5-point Likert scale (1-5) ranging from strongly disagree=1, disagree=2, neutral=3, agree=4, and strongly agree=5. The access will be described and tabulated with frequency and percentage.

Results for the significance of the variables related to endogenous motivational access, exogenous motivational access, operational skills, information skills, strategic skill, general usage access, and instructional usage access for finding the extent of the digital divide amongst the teachers in the healthcare profession will be determined using non parametric Kruskal-wallis test (for ordinal data) analysis at a 5% level of significance ($p \leq 0.05$).

For secondary objective: The reliability of the proposed module will be evaluated by calculating the intra-class correlation coefficient between the two raters (standard and proposed). A high significant correlation is assumed at the value of $\rho=0.85$ for the intra-class correlation coefficient, and the sample size (N=60) is calculated accordingly based on the intra-class correlation coefficient. Evaluation and assessment of the targeted population for key outcome variables will be conducted based on the proposed module questionnaire once its reliability is established.

The questionnaire proforma will be initially created and tested for construct validity. Three experts will be approached, and with their consent obtained through email communication, their responses will be analysed for the validity of the questionnaire. A value of I-CVI (Item- Content Validity Index) score and S-CVI (Scale-Content Validity Index) score >0.8 will be considered applicable for each item. Intra-class correlation coefficient (ρ) will be used to find significant correlation between the two modules (standard and proposed). Furthermore, reliability will be tested at a Cronbach's value of 0.7, which will be considered applicable for each item.

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PARTICULARS OF CONTRIBUTORS:
1. Professor, Department of Prosthodontics and Crown and Bridge, Sharad Pawar Dental College and Hospital, Wardha, Maharashtra, India.
2. Professor, Department of General Pathology, Jawaharlal Nehru Medical College, Wardha, Maharashtra, India.
3. Pro-chancellor, Department of Physiology, Datta Meghe Institute of Higher Education and Research (Deemed to be University), Wardha, Maharashtra, India.
4. Professor, Department of Prosthodontics and Crown and Bridge, Sharad Pawar Dental College and Hospital, Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Anjali Bhoyar,
Professor, Department of Prosthodontics and Crown and Bridge, Sharad Pawar Dental College and Hospital, Sawangi (M), Wardha-442004, Maharashtra, India.
E-mail: dranjaliborle@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jun 09, 2023
- Manual Googling: Aug 30, 2023
- iThenticate Software: Dec 11, 2023 (9%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Jun 09, 2023**
Date of Peer Review: **Aug 27, 2023**
Date of Acceptance: **Dec 14, 2023**
Date of Publishing: **Feb 01, 2024**