

Empowering Sudanese Rural Women Through ICT in Education

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ABSTRACT

The main purpose of the present study was to explore empowering Sudanese rural women through ICTs in education. Information Communication Technologies (ICTs) powered educational technology applications more than ever. Sudanese rural women in a dire need to ICTs skills to utilize the internet effectively and develop their quality of life. Participants of present study were four girls from rural area in Sudan. The main purpose of this research study is to highlight ICTs challenges that Sudanese rural women encountered. Participants were interviewed so as to stand in reality of Sudanese rural women in terms of ICTs in education and empowered them. The findings indicated that negative perception of rural women toward ICTs in education sphere because of the lack of ICTs infrastructure; awareness and power consistency. Based on the result, there was a positive perception regarding empowering Sudanese rural women through ICTs in terms of economic in particular e-bank transaction and telecommunication centers.

Keywords: Women empowerment, ICTs, education, rural women, transaction and telecommunication

INTRODUCTION

Background of the Study

The 21st century has been considered the age of innovation of the World Wide Web (WWW). Instant Information and Communications Technology (ICT's), are used in many fields of knowledge such as medicine, engineering and education is no exception. It has been acknowledged that the internet in educational arena has changed the role of teachers as well as learners. Distance education provides a chance of interaction between instructors and learners either inside the classroom or outside such as a café, a library and even in office, Mustafa & Mubarak, (2022). Moreover, Sudan has acknowledged distance learning waves in the third decade of 20th century and at that time there was scarcity of formal education opportunities. Therefore, most of Sudanese learners had gone abroad to acquire knowledge. In the earlier of 1960s, the national T.V had attempted to disseminate asynchronous learning program by offering English language program throughout the capital city – Khartoum and the program was using for a limit period of time approximately two years and terminated. Furthermore, during that time University of Khartoum was endeavoring to deliver distance education program particularly in 1963 which was vocational program was targeting a few groups of learners. Whereby, in the earlier of 1990s Sudan was taking series steps toward fitting distance education and was establishing Open University of Sudan (OUS) as well as some higher institutions which were beginning to adopt the philosophy blended learning

recently. In fact, that distance education learners attend a physical site for a few hours per week in institutional colleges, Mubarak & Mustafa, 2020). ICTs has been playing an important role but, more dominant and sophisticated in various fields such as engineering and education is a corner stone of this era.

ICTs and Women Empowerment

It is obvious that ICTs open the door for people in particular rural women to keep in touch with the wide world. ICTs invade every corner in the world that encourage women to have access to paramount information which could improve their ICTs skills. ICTs are powerful in every discipline and also have the ability to affect strategies; they are a force in changing social, economic, and political philosophy. In this context, ICT empowering women via education, economic and developing in large. ICTs linked with two factors frequencies of accessing to the technologies which directly related to economic whereas second factor is that social interaction and engagement with wide world. Thus it is imperative to ensure that rural women might realize that nature of digital divide and the significance of these technologies in this era. Unfortunately, lack of access to Information and Communication Technologies becomes a measure of empowering women in terms of education; economic; social and political development, so empowerment of women in the context of ICTs in education is imperative to be highlighted in this study because ICTs powerful tools for building up the abilities and skills of users in order to acquire advanced ICTs by practicing formal and informal social or educational applications such as YouTube, Tik Tok; Facebook; LinkedIn and Snap Chat which can facilitate education process (Rani et.al 2025).

There are various themes from the literature on ICTs and empowering women; rural women and ICTs in education. ICTs play vital roles in reviving the economic; political and societal of empowering women as well as advancement of gender equality (Suwana, 2017, p. 213). In this context, ICTs in education to empower women has a strong potential as it allows them to access a wide range of educational Apps, software and nano learning app such as which are sufficient for improving learners learning skills such as languages and provide effective interactive educational environment. Women could use ICTs facilities in various fields for instance utilize process of digital and electronic transaction via e-bank or mobile banking, so take into consideration that e-books, e-journals and e-conferences; semantic scholar and ScienceDirect websites are provided free of charge. ICTs in education empowered women by offering e-learning course software applications in different subjects, languages, and skill sets free download such as AMOS, SPSS, Basin Model and Rosch Model.

Empowerment has been defined interchangeably and it is defined as freedom of people to arrange with control affect their lives, Amarjeet & Bhura, 2019). Women empowered is to build the strength of women in various domains gain the rights and equity that might enhance their perseverance and self-confidence whenever and feel self-worth and dignity. Pursuing their life inside and outside home, women empowerment has paramount advantageous in case of reducing poverty participation in development by increasing people outstanding performance in various sphere such as healthcare, social service and teaching, literacy of ICTs, studies have highlighted women empowerment cope with sociocultural that could allow women to gain equal opportunities of education rights which motivate women to protest and request against equity rights with man and that increases women desire to learn and upgrade their knowledge; familial; legal; political empowerment. (Women's empowerment is a backbone in determining success of developing families and societies. Several studies reveal that women are suffering from various difficulties due to lack of education and information communications skills. Acquiring of rural women ICTs skills can empower and protect them from several challenges such as educational, financial and econ-societal barriers. Moreover, affordability of ICTs tools such as radio, television; social media; mobile phone and the internet are used to empower women for further awareness particular in education to create and share knowledge which could open more opportunities to women. Information and Communications Technology (ICTs) create massive disparity among rural and urban women this imbalance rights and make women suffering of effective participation and empowering.

LITERATURE REVIEW

In this section, extensive research and studies have been carried out regarding women's empowerments, particularly focusing on rural women in Asia and Africa. It appears that there is a lack of studies addressing the empowerment of rural women in Sudan through Information and Communication Technologies (ICTs) in Education and the development of ICT skills. ICTs have played a crucial role in advancing women across various domains, including economic, social, political, and educational sectors, affecting women in both developing and developed countries, whether in formal or informal employment. This has enabled women to better navigate social, educational, economic, and political obstacles by providing extensive opportunities to engage with ICTs and recognizing them as developers through skill enhancement (Daigavone, 2018). A comparable study, for example, by Patil (2018), Adhikaria & Keitsch (2021), and Bhura & Amarjeet (2019), indicates a positive influence on

women's empowerment in Africa and Asia, highlighting the beneficial role of education and economic development at both individual and community levels. In Nigeria, for instance, Moh & Magemybindo (2024) discuss how a philosophy of e-government creates opportunities for empowering women by enhancing their access to ICTs, which can lead to improve ICT skills among them as proficient users. Thus, ICTs have demonstrated the potential to alleviate social isolation, boost income, promote digital inclusion, and provide access to adaptive tools (Baruah 2019). Empowering women through ICTs, such as mobile phones, has offered essential services that connect women globally, enabling them to enhance their economic income and support family stability. ICT tools are advantageous for women to develop their skills by providing access to devices and applications that facilitate learning computer skills and internet usage awareness. ICTs elevate women's financial status and various skills, contributing to family stability (Sharma et al. 2018).

Information and Communication Technologies (ICTs) present opportunities for socio-economic development and educational advancement, offering solutions to develop challenges and poverty alleviation, particularly for women in rural areas. They enhance productivity and elevate learning standards for practitioners. Additionally, ICTs have been delivering multiple services, including healthcare and education for the illiterate, while facilitating access to various types of information. These technologies have empowered women through diverse educational tools, enabling their active participation in community affairs and motivating them to make informed educational decisions regarding their lives (Malik et al., 2022; Tavonga Njaya, 2015). Furthermore, ICTs strengthen women's capacity to confront socio-political gender inequalities in education, thereby improving their socio-economic status (Dewri & Sarma, 2025). Acquiring ICT skills can assist women in pursuing their education and fostering self-empowerment within their communities. Consequently, Open and Distance Learning plays a crucial role in empowering women (Mocan, 2014; Lesinger et al., 2022). It is regarded as a viable solution to help women attain their educational aspirations and promote social, cultural, and economic development on a global scale (Shumaila et al., 2016). Information and Communication Technologies (ICTs) promote the involvement of women in community development and enhance their awareness of advanced computer skills (Batoool & Batoool, 2018). In the current era, while ICT may not be considered cutting-edge, it remains essential for advancing women's empowerment. It has been shown to enhance women's empowerment by increasing their income and boosting their self-esteem (Samarakoon & Parinduri, 2015). Education plays a crucial role in empowering women in middle-income settings, as noted by Mubarak & Waseh (2025), through community awareness programs aimed at bridging the gap between education and empowerment. By focusing on the education of rural women, as highlighted by Suwana (2017), we can address issues such as the digital divide, digital media literacy, the gender digital divide, and women's media literacy. It is imperative for women in rural areas to acquire intensive digital media literacy skills to effectively utilize the internet and computer skills which can empower them and improve their quality of life. The empowerment of women in ICTs has been affected by rising poverty, family income, and social barriers (Debbarma & Chinnadurai, 2023). Furthermore, empowering women contributes to socio-economic growth and the creation of resilient communities (Sharma et al., 2018).

In contrast, women in rural areas are significantly distant from the global sharing and exchange of information and knowledge, primarily due to decline in ICT skills. Therefore, empowering women through ICTs could facilitate societal development through education (Bansal & Tindal, 2022). Consequently, ICTs have been instrumental in empowering women in various capacities, such as entrepreneurship and small business initiative, which can help alleviate poverty and reduce illiteracy. Moreover, it has been observed that rural women's income has improved; however, the lack of ICT skills and awareness presents substantial barriers to women's empowerment in education (Akmgade, 2019; Dhana et al., 2020). Indeed, rural women require intensive training that includes internet services focused on addressing digital illiteracy which is a necessary skill. It appears that women in Africa, particularly in Sudan, have been marginalized regarding their access to technology skills including assessing, sharing, adopting, and applying digital resources in an advanced manner, especially among rural women. Thus, the availability of social networking and the internet has enabled women to interact and acquire advanced technology skills. However, several obstacles have been faced by Sudanese rural women in pursuing their education through ICTs, such as income and socio-economic barriers. Furthermore, rural women have encountered challenges related to ICT skills due to various factors, including access to technology, computer usage, language barriers, and the scarcity of ICT infrastructure in rural areas (Tavonga, 2015; Batoool & Batoool, 2018; Suwana, 2017; Islam, 2015; Nirro & Crompton, 2022).

Information and Communication Technologies (ICTs) are regarded as a fundamental element and a solution for holistic development, poverty alleviation, and the empowerment of women in contemporary society. As a result, ICTs have revealed significant gender disparities with women experiencing lower levels of access to and utilization of ICTs compared to men over the past few decades (U.N, 2005). This situation presents numerous challenges to societal development in Sudan, particularly the lack of ICT skills among rural women and the high illiteracy rate concerning ICTs which affects over 75% of the Sudanese population who do not have internet access. Furthermore, less than 10% of women possess adequate ICT hardware, with only 16% or fewer utilizing the

internet. Additionally, women are 21% less likely to own a mobile phone. The inadequate infrastructure, unreliable power supplies, and inconsistent internet connectivity hinder rural women's access to online educational platforms, thereby restricting the benefits of technological advancements from reaching rural communities. Socio-cultural norms and stereotypes frequently dissuade women from pursuing education or careers in technology. It appears that gender biases and societal expectation further limit women's access to digital tools and opportunities (Dhana et al., 2020). Specifically, cultural norms may prevent women from participating in technology-related learning, compounded by the lack of sufficient training opportunities. Many women residing in rural regions may not fully grasp the significance of digital skills in their lives or have access to information regarding training programs. Consequently, economic limitations; marginalized women; and their inability to afford digital devices and internet services necessitate the execution of the current study. This study aims to thoroughly examine the extent to which Information and Communication Technologies (ICTs) enhance women's empowerment in the rural areas of central Sudan, specifically in Al-Jazeera province. The present research utilizes a diverse sample that has not been previously tested to ascertain a concrete understanding of the role of ICTs in education and the degree to which they can empower rural women in central Sudan. Women in these rural areas who may have limited access to conventional educational institutions, stand to gain from online courses, webinar, and virtual classrooms, thereby surmounting geographical barriers to education as noted by Debbarma and Chinnadurai (2023), Nayyar et al. (2019), Roy et al. (2017), and Sharma & Satpathy (2022). The objective of this study is uncover the overall implications of exploring the perception of empowering Sudanese rural women through ICTs within the educational context. To achieve this, the following research questions have been formulated.

1-To what extent ICTs in education empowering Sudanese rural women?

2-What are the challenges of ICTs face in empowering Sudanese rural women?

METHODOLOGY

This section emphasizes a comprehensive understanding of participants' views on empowering Sudanese women, particularly in the context of ICTs in education. The current study employs a qualitative research methodology, specifically a phenomenological approach to elucidate the significance of individuals lived experiences and to gain a deeper insight into the phenomenon affecting those directly involved (Creswell, 2014; Sekaran & Bougie, 2016).

Participants

Regarding the participants interviewed in the current study, ethical approval was obtained directly from them. This study was conducted during the summer of 2023, and the selection of participants was based on their availability, as they voluntarily agreed to participate based on their personal choice. Participants were selected and contacted through WhatsApp, along with face-to-face interactions. In accordance with this approach, open-ended questions were utilized to encourage participants to share their experiences candidly. Additionally, informed consent was obtained ethically; participants were given ample information about the research objectives to help them decide whether they wished to take part in the study. Throughout the interview process, participants were repeatedly reminded of the research objectives, and they were informed that they could withdraw from the interview at any point if they chose to do so. Another ethical consideration was that the actual names of the participants were coded to maintain the confidentiality of their personal identities, including details such as age and religion. Notes were taken during the interview process solely for the purpose of accurate data transcription, while the researchers focused on detailed information during the actual interviews. To safeguard the identities of the interviewees, only data pertinent to the study regarding their backgrounds were recorded. The transcription of the recorded interviews was carried out with a focus on every single word followed by careful rereading and listening to reduce errors (Kvale & Brinkmann, 2009).

Validity was evaluated occasionally through out this research. The researchers engaged in theoretical interpretation within the present study. The focus on validity is not outcome-driven; instead it is rooted in planning design, interviewing, transcribing, and data management. In this study, control testing of the interview questions was carried out the pilot study. Participants responses were examined in a way that allowed for opportunities to clarify, control, and validate those responses. Consequently, during the meeting, the researchers committed to maintaining the confidentiality of all information and ensuring privacy. Therefore, data will be deleted upon the completion of the study.

Instrumentation and Data

Then, pilot implementation of present study was applied with four rural women, thus the interview questions were finalized. This study was conducting during the summer 2023. So, participants of present study were four

girls (age range between 25 to 37 years). In this study, the sampling frame was obtained from villagers women in central Sudan. The researchers were fixing meeting time with the target interviewers and they had informed twice and finally had verified that they were willing to share their own learning perception in terms of ICTs in education. Before embark the initial interview, the researchers were explaining thoroughly the purpose of the study. The interview was taking half an hour in a traditional house foyer and the participants were coming on time as they had promised. The interview was carried out in Arabic language and translated to English language.

Data Analysis

In this section, researchers were conducting the interview which carried out basically in Arabic language and translated to English language. The data have been transferred in the word program, pertaining to the analysis of this study thematic analyzed and were discussed thoroughly namely:

RESULTS

Theme 1: ICTs in Education Empowering Sudanese Rural Women

In this age women empowered via ICTs in Africa and Asia and they could develop their societies via education (Bansal & Tindal, 2022). Thus, ICTs have been empowering women in various ways for instance entrepreneurial and medium business, so they could diminish poverty and illiteracy. In this context, the participants generally perceived that effectiveness of ICTs in education and social interaction enabled them to easily access; navigate and engaged with their peers and others. The participants could use multi media and download files and write on white board, talk via video calling on some of social media for instance: pertaining to merits of ICTs in education, the majority of participants said that use of ICTs tools can assist them to improve their ICTs literacy skills. Additionally, some participants in this study demanded that they found it easier to access, retrieve, navigate and communicate with others at anywhere and anytime by different types of social media".

"I prefer using YouTube watching and making comment because most social media platforms are more efficient and faster for calls and chats".

In fact that, rural women could access social networking sites, weblogs, social media and blogs, micro-blogging, in this point rural women emphasized that ICTs promoted their sense of confidence in the way that they were able to run applications and interact with active and open talk she narrated that *"I have learnt much skills via interaction with others and even improved level of English skills and share personal experiences and could discuss some current social issues and educational issues"* *"additionally, I felt that a strong social bonding, so that I feel happy to spend a lot of time with people whom have advanced ICTs skills than I"*.

In this section, a qualitative method has been used to highlight into the Sudanese rural women perception of ICTs in education in summer 2023. The general results recommended that the participants in this study can be described quite positive toward ICTs tools. In particular, the education sphere provides them with skillful, real literacy, usefulness and sense of active engagement. Regarding to ICTs in education the majority of rural women in this study confirmed that the ICTs tools were useful for them and improve skills and technology literacy. In this sense, the first significant finding is that Sudanese rural women using some of technology tools, applications and become awareness of many skills. They used it practically in education such as direct chat board and spreadsheet exchange it with others. In contrast, there are differences in the participants ICTs skills general information and educational information, so the participants use general information such as social media WhatsApp, You tube, Tik Tok and handphone call for telecommunication and even e-bank for transaction whereas, educational purposes that restricted for down load files and retrieving articles related to their objectives and issues. As have been found from the literature, Sudanese rural women have empowered via ICTs in education because they could eliminate ICTs illiteracy by using different tools and applications. Researchers found out that the core idea for empowering Sudanese rural women establishing massive training workshops and training sessions that organizing from the calm atmosphere, rural women have gained sophisticated ICTs skills which in line with Mocan, 2014, Lesinger, et al 2022, Shumaila, et al, 2016 (Batoool & Batoool 2018). In addition, it is noticeable that this findings is in lines with Akmgade, 2019, Dhana et.al 2020, who concluded that webinars, and virtual classrooms, overcoming geographical barriers to education Debbarma, & Chinnadurai, 2023. Nayyar, et al, 2019. Roy, et al, 2017; Sharma & Satpathy, 2022 (Adhikaria & Keitsch, 2021). Active and in-depth female engagement in ICT in learning and education motivate them to become more empowered. It is obvious that, Sudanese rural women have got several facilities and opportunities via ICTs and knowledge sharing, involved in participatory activities. Moreover, they could access to many educational services generate income, such as e-bank and telecommunication centers beside they could interact, collaborate, network, and videoconferences. Regarding learning opportunities they enrolled in an online learning as well as mobile learning so they have empowered via flexible access ICTs software and generated formal and informal educational opportunities and owned mobile,

laptop and tablet, MP3, and desktop. Moreover, they transform the delivery and reception of knowledge by offering a more collaborative and interactive learning experience with peers and friends, beside that they can access affordable, secure e-banking services which assist them to better toward managing their family's income. Through digital and mobile technologies, rural women can save the time, increase income of their families. Therefore, availability of software applications and hardware applications even entertainment games and statistical package and languages courses enable to diagnose level of language skills and interact with professionals worldwide. The ICTs in education facilitate several activities for instance the Internet will be easy for rural women access and interact via social media therefore, in the literature that supports the perception of Sudanese rural women using ICTs in education for learning purposes.

Theme 2: Challenges of ICTs Encounter Empowering Sudanese Rural Women

In this section, analyzing data in this phase researchers followed systematic strategies before analyzing had taken step which was preparing and organizing themes for analysis, coding then representing the data and followed a thematic analysis the data setting based on interview questions of this study. The participants use ICTs effectively and allowed them to learn and develop skills whereas there are many barriers she commented that *"sometimes due to weakness of the internet service and even no consistent electricity power and also broadband services become extremely difficult to be gained. We could communicate with peers to guide each other in some technological issues via available media such as Whats.App and direct mobile phones. However, when it comes to websites, we encounter difficulties have been facing in terms of language limitation unfortunately most of websites need advanced English"* This result is consistent with Nayyar, et al, 2019. Roy, et al, 2017 ; Sharma & Satpathy, 2022. In contrast the participants added that *"I'll tell you straightaway that the internet connection / coverage was a complete disaster. Another factor is that increases the cost of broadband and the internet service because it was high demand on that device, so I dissatisfied with a poor internet connection. Frankly, we unable to participate in global e- libraries due to illiteracy of English language. In the light of mentioned interview transcription"*. It is obvious that regarding to statement, researchers passed through the data and categorized it into chunks in order to be analyzed. Thus, it have been refined and filtered the themes clearly to discuss and report in the findings of the present study. The rural women were shown positive perceptions toward ICTs in social media for instance technical challenges limitations regarding to the internet services and consistency of electricity power. This point which were agreed by almost of the respondents in this study. Female empowerment could diminish poverty and illiteracy in contrary, it has improving rural women income, lack of ICTs skills and lack of ICTs awareness are obstacles of women empowering women in education, Akmgade, 2019, Dhana et.al , 2020, Nayyar, et al, 2019. Roy, et al, 2017 ; Sharma & Satpathy, 2022. Absence effective interaction and lack of ICTs skills in particular computer skills and majority of programs in English language. These factors disappointed and frustrated us to develop computers skills and made negative experiences. The result in this study was formed via a tangible interview. It means that participants showed negative perception toward ICTs in education for instance lack of online interaction, power consistency. Moreover, some of rural women had faced ICTs challenges and they could not manage it, so they showed negative experiences. The present study had shown that negative perception toward ICTs in education and that was occurring to villagers day life in central Sudan entirely. In light of the data transcription and a tangible interview, it is obvious that the present study showed perception of Sudanese empowered rural women central Sudan in particular whom had shown negative perception toward ICTs in education sphere, in contrary Sudanese rural women empowered in economic via ICTs services specifically telecentres and e-bank transaction. The finding is that they had shown positive perception toward ICTs in social and economic empowerment. In relation to the positive perception of ICTs within e-banking and telecommunication centers, this finding regarding the enhancement of societal, economic, educational, and political empowerment of rural women through ICTs aligns with the previous results reported by (Daigavone, 2018). It is noted that they were unable to download files due to limitations in local network coverage, which suggests that webinars could be conducted via social media platforms such as TikTok and Facebook. Furthermore, technical barriers and lack of ICT skills have been identified with family income and societal norms serving as significant obstacles that greatly influence educational facilitation. In this context, the current research study demonstrated that Sudanese rural women have been empowered in education through ICTs, however, the e-banking services and telecommunication options available do not adequately meet the needs of these rural women. This study highlighted a critical need for rural women in central Sudan which is often overlooked particularly concerning issues such as power consistency, internet coverage, and family support for online learning, as well as prevailing societal norm. Consequently, it is essential to address and mitigate technical internet barriers, such as network coverage issues that may emerge during emergency situations.

CONCLUSION

Information and Communication Technologies (ICTs) in education have played a significant role and are regarded as a dominant force in this era. ICT tools are utilized for the empowerment of rural women in Sudan. This study examined and analyzed the opportunities, challenges, and participation involved in empowering rural women through education by adopting ICTs. The findings indicated that there are limitations in internet

accessibility, particularly concerning the capacity to access educational websites, and many are not active internet users. Additionally, low educational levels, a lack of ICT training, and cultural and social norms have an impact. Consequently, participants exhibited a negative perception of ICTs in education.

LIMITATIONS AND RECOMMENDATIONS

There are two limitations of the present study. Firstly, the results are constrained as they rely on the participants' narratives which may not be entirely truthful. Secondly, there is a limitation related to the small sample size of rural women which affects the reliability of the results. Consequently, due to the limited sample size, the researchers propose that future studies could employ mixed research methods and utilize various instruments. Therefore, future research should be conducted with larger sample sizes to create a comprehensive understanding of empowering rural women in central Sudan.

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