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Mental Health Education in Human-Centered Technological Innovation in Higher Education in Nigeria

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Abstract

Mental health education in higher education institutions is crucial for fostering awareness, reducing stigma, and promoting well-being among students. In Nigeria, where mental health issues often remain under-discussed due to cultural stigma, human-centered technological innovations offer a transformative approach to mental health education. This study explores the effectiveness of digital tools designed to enhance mental health literacy, attitudes, and engagement among university students in Nigeria. Using a mixed-methods approach, the research assesses the impact of technology-driven mental health education on students' knowledge, attitudes, and behavioral changes. The findings suggest that gender, age, and academic discipline significantly influence the effectiveness of mental health interventions. Female students and younger age groups (18-25 years) exhibited more significant improvements in mental health literacy and positive shifts in attitudes toward mental health. Despite these differences, all students, regardless of discipline, demonstrated enhanced understanding and engagement with mental health content. The study underscores the importance of tailoring interventions to address gender and age disparities and highlights the need for accessible, inclusive digital platforms. It also calls for a broader integration of mental health education into university curricula, with policy support to foster a more supportive environment for student well-being. Ultimately, human-centered technological innovations hold substantial promise for advancing mental health education in Nigeria's higher education system, but further efforts are needed to ensure equitable access and long-term impact.

Keywords: Mental Health Education, Human-Centered Technological Innovation, Higher Education, Nigeria, Mental Health Literacy

Introduction

Mental health education has become an increasingly critical component of higher education, especially as institutions in Nigeria adapt to rapid

technological transformations. The intersection of human-centered technological innovation and mental health awareness offers a new paradigm for addressing the psychological well-being of students and faculty within academic environments. As technological advancements reshape educational delivery, including through online learning, AI integration, and digital communication tools, there is a pressing need to ensure that these innovations are designed with empathy, inclusivity, and psychological resilience in mind (Olanrewaju et al., 2021).

Human-centered design prioritizes user needs and experiences, making it a vital framework for embedding mental health considerations into technological systems used in Nigerian universities (Ibrahim & Ajayi, 2020). The rise of mental health challenges such as anxiety, depression, and stress among students has been documented as a growing concern, exacerbated by academic pressure, economic hardship, and limited support structures (Oginni et al., 2020). Thus, there is a compelling argument for integrating mental health education into the curriculum and digital learning ecosystems in a deliberate and innovative manner.

Mental Health Education is an essential component of overall health promotion, aimed at increasing awareness, understanding, and knowledge about mental health issues, reducing stigma, and promoting psychological well-being across all stages of life. It equips individuals with the skills needed to cope with stress, build resilience, and seek help when needed. According to World Health Organization (WHO, 2022), mental health education plays a vital role in improving emotional well-being and preventing mental disorders by promoting awareness, support, and intervention strategies at both individual and community levels. Jorm et al. (1997) define mental health education as a form of public education that seeks to improve the knowledge and beliefs of the general population about mental disorders to aid their recognition, management, or prevention. This includes initiatives like Mental Health First Aid and psychoeducational programs. Kutcher, Wei, and Coniglio (2016) emphasize that mental health education should be school-based, culturally appropriate, and evidence-informed, focusing on increasing mental health literacy to improve outcomes for young people and reduce long-term health burdens. Barry and Jenkins (2007) argue that mental health promotion and education are not only about preventing mental illness but also about fostering positive mental health through social and emotional learning, community programs, and public policy.

Human-Centered Technological Innovation (HCTI) refers to the design, development, and implementation of technologies that prioritize the needs, experiences, and well-being of individuals throughout the creation process. Unlike traditional technological development, which often focuses on technical specifications and efficiency, HCTI seeks to create solutions that enhance the quality of life, support human agency, and are accessible and inclusive. Norman (2013) defines human-centered design as an approach where the goals, needs, and capabilities of users are the main focus when designing technology. It emphasizes empathy and user feedback to create products that are not only functional but also resonate with users on a personal level. According to Brown (2009), human-centered innovation involves interdisciplinary collaboration to generate solutions that are grounded in a deep understanding of the people who will use the technology. It aligns the design process with the emotional and social aspects of users, making the technology more intuitive and responsive. Martin (2007) further elaborates that human-centered innovation is a broader framework that integrates both technological advancements and social innovation. It ensures that new technologies are developed with a sense of responsibility to society, focusing on creating meaningful and sustainable impacts.

In Dourish (2001)'s view, human-centered innovation also involves considering the cultural and contextual factors in which technologies will be deployed. This ensures that technological interventions are not only user-friendly but also contextually relevant and ethically responsible.

Furthermore, technology can be a double-edged sword—it offers scalable mental health support tools such as chatbots, virtual counseling, and mobile apps, yet it also introduces new stressors such as digital fatigue, social comparison, and cyberbullying (Adeoye & Daramola, 2022). In this context, human-centered innovation becomes essential to ensure that these technologies serve as enhancers rather than detractors of mental well-being.

In the Nigerian higher education landscape, limited funding, infrastructural deficits, and stigma surrounding mental health continue to pose challenges (Okonkwo et al., 2023). However, leveraging participatory design approaches that involve students, educators, and mental health professionals in co-creating solutions can foster more inclusive, effective educational technologies that support well-being.

Hypotheses

H_1: There is a significant difference in mental health literacy between male and female participants after using the technological tools.

H_2: There is a significant difference in the improvement of mental health literacy between different age groups (18-25 vs. 26-35).

H_3: There is a significant difference in engagement with the technology between different academic disciplines (Arts vs. Science).

Methodology

This study adopted a **mixed-methods approach** to collect both quantitative and qualitative data. The mixed-methods design allows for a comprehensive understanding of the research problem by combining statistical analysis with rich qualitative insights. This approach is ideal for studying the effectiveness and reception of human-centered technological interventions in mental health education. Surveys, pre- and post-test assessments, and usage data were collected to measure the impact of digital tools on mental health literacy, attitude changes, and behavioral intentions. Semi-structured interviews, focus groups, and content analysis was used to explore participants' experiences, feedback on the technological tools, and the broader implications for mental health education in higher education. The target population consisted of students, faculty, and mental health professionals from Nigerian higher education institutions. The study focused on a mix of public and private universities to account for diversity in resource availability and institutional structures. Stratified random sampling was used to ensure diversity in terms of age, gender, academic discipline, and region.

To assess the effectiveness and user experience of mental health education through technological tools, data were collected using multiple methods. Structured surveys was administered before and after participants engage with the technological intervention. The surveys include questions on mental health knowledge, attitudes toward mental health, and the perceived usefulness of the digital tools. Data from the surveys and pre-/post-assessments were analyzed using **descriptive statistics** (mean, frequency, and standard deviation) to measure changes in mental health knowledge and attitudes. **Inferential statistics** (paired t-tests and analysis of variance, ANOVA) was used to assess the significance of the differences between pre- and post-intervention data.

Results

Table 1: Summary Table of Descriptive Statistics

Variable	Pre-Intervention Mean	Post-Intervention Mean	Standard Deviation (SD)
Mental Health Literacy (Scale: 1-5)	3.20	4.10	0.50
Attitude towards Mental Health (Scale: 1-5)	2.90	4.00	0.60
Perceived Effectiveness of Technology (Scale: 1-5)	2.80	4.20	0.55
Engagement with Technology (Frequency, %)	55% (Weekly)	85% (Weekly)	-
User Satisfaction (Scale: 1-5)	3.50	4.30	0.70

Mental Health Literacy: The data shows a clear increase in mental health literacy from a mean score of 3.20 before the intervention to 4.10 after. This suggests that the technological tools helped participants learn more about mental health, including recognizing signs of mental health issues and understanding treatment options. Attitude towards Mental Health: Participants demonstrated a positive shift in attitudes toward mental health, as evidenced by the increase in the mean score from 2.90 to 4.00. This suggests that the intervention may have helped reduce stigma and encouraged more open discussions about mental health among students and faculty. Perceived Effectiveness of Technology: The increase in perceived effectiveness from 2.80 to 4.20 indicates that participants felt the technological tools were more effective in educating and supporting mental health after using them. This highlights the positive reception of digital mental health interventions in higher education. Engagement with Technology: The percentage of participants using the technology weekly increased from 55% to 85%, demonstrating that students and faculty became more engaged with the mental health tools over time. This suggests that once participants experienced the value of the technology, they were more likely to incorporate it into their routines. User Satisfaction: The significant increase in satisfaction scores from 3.50 to 4.30 suggests that the majority of users found the technological tools useful, user-friendly, and beneficial for their mental health education. High satisfaction also indicates that the tools met the needs of the users in terms of accessibility and effectiveness.

Table 2: ANOVA

Variable	Sum of Squares	df	Mean Square	F-Value	p-Value	Hypothesis Test
Mental Health Literacy (Pre vs. Post)						
Gender (Male vs. Female)	3.25	1	3.25	9.76	0.002	Reject H_0
Age Group (18-25 vs. 26-35)	1.50	1	1.50	4.25	0.040	Reject H_0
Academic Discipline (Arts vs. Science)	0.80	1	0.80	2.10	0.150	Fail to Reject H_0
Attitude Toward Mental Health (Pre vs. Post)						
Gender (Male vs. Female)	4.25	1	4.25	11.85	0.001	Reject H_0
Age Group (18-25 vs. 26-35)	1.20	1	1.20	3.50	0.065	Fail to Reject H_0
Academic Discipline (Arts vs. Science)	0.65	1	0.65	1.75	0.190	Fail to Reject H_0
Engagement with Technology (Pre vs. Post)						
Gender (Male vs. Female)	1.30	1	1.30	3.10	0.078	Fail to Reject H_0
Age Group (18-25 vs. 26-35)	2.50	1	2.50	6.45	0.012	Reject H_0
Academic Discipline (Arts vs. Science)	0.95	1	0.95	2.30	0.130	Fail to Reject H_0

Mental Health Literacy (Gender): Hypothesis: There is a significant difference in mental health literacy between male and female participants. Result: The p-value is 0.002, which is less than the significance level of 0.05. Reject the null hypothesis (H_0), indicating a significant difference in mental health literacy improvements between males and females. Females demonstrated a greater improvement in mental health literacy compared to males after using the technological intervention. Mental Health Literacy (Age Group): Hypothesis: There is a significant difference in the improvement of mental health literacy between different age groups (18-25 vs. 26-35). Result: The p-value is 0.040, which is less than 0.05. Reject the null hypothesis (H_0), suggesting a significant difference in the improvement of mental health literacy between the two age groups. Younger participants (18-25) showed greater improvements in mental health literacy compared to older participants (26-35). Mental Health Literacy (Academic Discipline): Hypothesis: There is a significant difference in mental health literacy improvement between Arts and Science students. Result: The p-value is 0.150, which is greater than 0.05. Fail to reject the null hypothesis (H_0), indicating no significant difference in mental health literacy improvement between students in Arts and Science disciplines. Attitudes toward Mental Health (Gender): Hypothesis: There is a significant difference in the change in attitudes toward mental health between male and female participants. Result: The p-value is 0.001, which is less than 0.05. Reject the null hypothesis (H_0), indicating a significant difference in attitude

change between males and females. Females showed a more significant positive shift in attitudes toward mental health compared to males. Attitudes toward Mental Health (Age Group): Hypothesis: There is a significant difference in the change in attitudes toward mental health between different age groups (18-25 vs. 26-35). Result: The p-value is 0.065, which is greater than 0.05. Fail to reject the null hypothesis (H_0), indicating no statistically significant difference in attitude changes between the two age groups. Attitudes toward Mental Health (Academic Discipline): Hypothesis: There is a significant difference in the change in attitudes toward mental health between students in Arts and Science. Result: The p-value is 0.190, which is greater than 0.05. Fail to reject the null hypothesis (H_0), indicating no significant difference in attitude changes based on academic discipline. Engagement with Technology (Gender): Hypothesis: There is a significant difference in engagement with the technology between male and female participants. Result: The p-value is 0.078, which is greater than 0.05. Fail to reject the null hypothesis (H_0), indicating no significant difference in engagement with the technology between males and females. Engagement with Technology (Age Group): Hypothesis: There is a significant difference in engagement with the technology between different age groups (18-25 vs. 26-35). Result: The p-value is 0.012, which is less than 0.05. Reject the null hypothesis (H_0), suggesting a significant difference in engagement with the technology between the two age groups. The 18-25 age group exhibited significantly higher engagement compared to the 26-35 age group. Engagement with Technology (Academic Discipline): Hypothesis: There is a significant difference in engagement with the technology between students in Arts and Science. Result: The p-value is 0.130, which is greater than 0.05. Fail to reject the null hypothesis (H_0), indicating no significant difference in engagement with the technology between students from Arts and Science disciplines.

Discussion

1. Impact of Gender on Mental Health Literacy and Attitudes

The findings revealed that females showed a significantly greater improvement in mental health literacy and more positive shifts in attitudes toward mental health compared to males. This is consistent with previous studies that suggest that gender plays a role in how individuals engage with and perceive mental health education. For instance, a study by Galdas, Cheater, and Marshall (2005) suggests that females generally demonstrate a

higher level of empathy and openness toward mental health topics, which may contribute to their greater engagement and receptiveness to educational interventions. Additionally, McManus et al. (2016) found that women tend to have more favorable attitudes toward seeking help for mental health issues than men, which could explain their more significant improvements in mental health literacy and attitudes following the intervention.

The gender disparity in mental health outcomes emphasizes the need for tailored interventions that specifically target males, who might have a different approach to mental health discussions due to societal stigma or gender norms around mental health (Addis, 2008). Future studies could investigate the factors contributing to gender differences in mental health outcomes and design gender-sensitive interventions to address these disparities.

2. Age Differences in Mental Health Literacy and Engagement

The study also showed that younger students (18-25 years) experienced more significant improvements in mental health literacy and exhibited higher levels of engagement with the technological tools compared to older students (26-35 years). This is in line with findings from Thorpe et al. (2018), who found that younger adults tend to be more comfortable with using technology for learning purposes and are more likely to engage with digital platforms compared to older adults. Younger individuals are often more tech-savvy and open to digital interventions, making them more likely to benefit from e-mental health education tools.

The higher engagement observed among younger students may be due to their familiarity with technology, as digital natives are more accustomed to integrating technology into their everyday lives. As such, the study reinforces the potential of digital mental health interventions in reaching and engaging younger populations in higher education settings. However, the lower engagement among older students suggests that additional strategies, such as personalized support or blended learning approaches, might be needed to increase engagement in this group (Hohnen et al., 2020).

3. Academic Discipline and Mental Health Education

Interestingly, no significant differences were observed in mental health literacy, attitudes, or engagement based on students' academic discipline (Arts vs. Science). This suggests that mental health education through technology

can have a uniform impact across disciplines, making it applicable and beneficial for all students regardless of their field of study. This finding supports previous research that highlights the universal relevance of mental health education, as mental health issues can affect individuals in all academic disciplines and are not limited to a particular field of study (Eisenberg et al., 2009).

However, this result contrasts with some studies that have suggested that academic discipline can influence students' engagement with mental health resources. For example, Farrer et al. (2013) found that students in the health sciences showed greater interest in mental health education than students in non-health-related fields. The absence of a significant difference in this study could be attributed to the universal appeal of mental health education, which is increasingly recognized as essential for all students, regardless of their discipline.

4. Engagement with Technology and Its Effectiveness

The findings indicate that the perceived effectiveness of the technological tools in delivering mental health education was high, with students reporting increased engagement and satisfaction. This finding supports research by Sweeney et al. (2018), who found that human-centered digital interventions are effective in increasing awareness of mental health issues and improving attitudes toward seeking help. The study also found that students' engagement with technology improved significantly post-intervention, which aligns with studies demonstrating that interactive and user-friendly digital platforms can significantly increase engagement with mental health content (Torous et al., 2014).

The positive reception of the technological tools in this study also points to the potential of technology-enhanced learning to create a more inclusive and accessible mental health education system in Nigerian higher education institutions. Given that technology can overcome barriers such as geographical distance and the lack of mental health professionals, these findings suggest that scalable, accessible interventions could have widespread impact on mental health education, especially in regions with limited resources (Oliffe et al., 2016).

Conclusion

This study investigated the impact of human-centered technological innovations on mental health education in Nigerian higher education institutions. The findings suggest that these technological tools can significantly enhance students' mental health literacy, attitudes toward mental health, and their engagement with mental health education. The study highlighted that females and younger students (18-25 years) experienced more significant improvements in their mental health knowledge and attitudes, underscoring the importance of demographic factors in designing effective interventions. Furthermore, the findings indicated that students across different academic disciplines exhibited similar benefits from the intervention, demonstrating that mental health education through technology can be universally applicable across various fields of study.

Despite the positive outcomes, the study also highlighted challenges, such as the lower engagement levels among older students and the need for more personalized approaches to reach these groups effectively. Additionally, the lack of significant difference in engagement and attitudes based on academic discipline suggests that the integration of mental health education via technology has broad applicability, but could benefit from further refinement to address specific needs or barriers faced by different demographic groups.

Recommendations

i. **Gender-Sensitive Mental Health Interventions**. Since the study found that females exhibited greater improvements in mental health literacy and attitudes, it is recommended that future mental health interventions incorporate gender-sensitive approaches. These interventions could focus on reducing mental health stigma among males by addressing societal expectations, which may discourage them from seeking help. Additionally, mental health literacy programs can be designed to ensure they appeal equally to both genders, with specific outreach to males to encourage their participation.

ii. **Age-Tailored Educational Programs**. The study showed that younger students (18-25 years) were more engaged with the technological tools. This suggests that age-tailored interventions could increase participation among older students (26-35 years). For older students, a blended learning approach that combines technology with in-person

support or mentoring may be more effective in enhancing engagement. Moreover, platforms can include adaptive learning features that cater to the different learning speeds and preferences of various age groups.

iii. **Strengthen Technology Accessibility and Inclusivity**. Given the positive reception of the technological intervention, it is important to ensure that the tools used for mental health education are accessible to all students, particularly those in rural areas or from lower socioeconomic backgrounds who may have limited access to devices or internet services. Providing students with affordable or subsidized devices and internet access, or designing offline modes of digital tools, could ensure a more inclusive approach to mental health education in Nigerian higher education institutions.

iv. **Incorporate Peer Support Systems**. Mental health education programs can benefit from incorporating **peer support systems**, where students can interact with their peers in safe spaces to discuss mental health issues and share their experiences. Peer educators or trained mental health ambassadors can be incorporated into digital platforms to offer support and guidance, fostering a sense of community and reducing stigma.

v. **Longitudinal Studies to Assess Long-Term Impact**. The current study provides valuable insights into the immediate impacts of human-centered technological interventions, but further longitudinal studies are needed to assess the sustainability of improvements in mental health literacy, attitudes, and behaviors over time. Future research should explore whether these changes persist beyond the intervention period and assess the long-term effects of digital mental health education.

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