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Editorial

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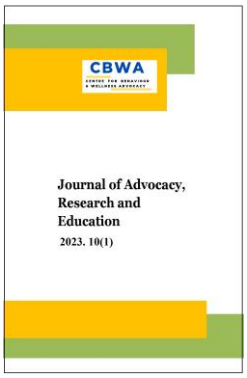

Editorial

Artificial Intelligence Chatbots, High-Tech Plagiarism, and Academic Publishing Integrity Conundrum: Are Local Journals in Africa Ready?

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Abstract

Artificial intelligence chatbots are one of the innovative examples of machine learning technology today. The inception of this technology has escalated several discussions on high-tech plagiarism in academic publishing. As the world gets overwhelmed with issues regarding academic integrity, an important task facing local African journals is "How equipped are their systems to ensure academic publishing integrity in the face of high-tech plagiarism?" This question demands a multifaceted call to action and a serious look at the current challenges facing local journals.

Keywords: Academic Publishing Integrity, African-Based Journals, Artificial Intelligence Chatbots, High-Tech Plagiarism.

1. African Journals' Woes

In one of my earlier editorials, I raised a rhetorical question, "*So, who cares if all the local journals in Africa are extinct*?" (Sarfo, 2019, p.3). It was clear in that paper that the challenges faced by African journals are multidimensional and may face extinction if not attended to with urgency. Over the years, Africa as a continent has been noted to provide a relatively small research output of approximately 2 %. Overall, the continent is also known to produce 0.1 % of all global patents (Gurib-Fakim, Signé, 2022). Among the fundamental challenges facing African journals is poor funding (Gurib-Fakim, Signé, 2022; Sarfo, 2019). Over the years, African governments have invested less in science and research than other continents (Gurib-Fakim, Signé, 2022). With this little investment into local journals, the important role played by African journals in the global research space can not be felt (Gurib-Fakim, Signé, 2022; Sarfo, 2018a; Sarfo, 2019).

The African Journals Online (AJOL), a well-known indexing for African-published scholarly journals, indicates on its website over 690 Journals from 39 Countries (The African Journals Online, 2023). Notwithstanding this growing number of African journals, most academics prefer foreign journals due to several reasons. These reasons include the prestige of publishing in well-known journals outside the continent (Alemna, 1996), the fast review process, good publishing

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standards, and great visibility through abstracting and indexing (Sarfo, 2019; Tarkang, Bain, 2019). According to Sarfo (2019), as harmless as the choice to publish in top-tier journals whose publishers are well-established outside the African continent, it adversely affects the number of quality papers these African researchers and academics submit to local journals.

Additionally, most vibrant African journals are usually cashless and have no assets. As Clobridge (2014) indicated, these journals rely solely on donor support and often generate no income or profits. The only benefits they get from host institutions are "office space, office equipment, telephones, or internet access" (Clobridge, 2014: 7). Besides, the financial challenges experienced by many African journals are exacerbated by the choice to produce print versions of publications instead of online. Despite the considerable cost involved, Clobridge's (2014) study revealed that print editions are often favoured by African university libraries, readers, and the expectations of university promotion committees. Furthermore, local journals struggle with a shortage of high-quality manuscript submissions due to policy directives of African universities that encourage researchers and academics to publish in journals with high-impact factors to secure promotions and improve university rankings in the global arenas (Clobridge, 2014; Sarfo, 2019). Certain African publishers, constrained by systemic obstacles such as financial limitations and resources, struggle to obtain reviewers, often leading to a delay in completing manuscript reviews. Thus, they end up being perceived as less efficient in adhering to publishing standards compared to foreign publishers (Tarkang, Bain, 2019).

2. Artificial Intelligence Chatbots, High-Tech Plagiarism and Academic Publishing Integrity Challenge: Way Forward for African Journals

Artificial intelligence-powered chatbot technology has been a major topic of discussion in academia and scholarly publishers regarding its usefulness and challenges. The issue of abusing or misusing these artificial intelligence-powered chatbots to commit high-tech plagiarism is a major concern. High-tech plagiarism involves using sophisticated artificial intelligence technology to engage in plagiarism. However, a major concern in research and scholarly publishing is that detecting high-tech plagiarism is difficult since these internet-based tools can use machine learning algorithms to create manuscripts or content without authorisation. Also, the legitimacy of such content is sometimes questionable, as exhibited in a paper by King and ChatGPT (2023). Notwithstanding the gains brought in by this technology, its existence and future expansion to African-based publishers and journals will compound their existing challenges. Despite potential resource constraints, African journals require a thoughtful and adaptable approach to ensure the highest academic publishing integrity.

To tackle this growing high-tech plagiarism and uphold the integrity of academic publishing, African journals and publishers/host universities should establish comprehensive training programmes on scientific and scholarly writing within higher education institutions. One such popularly shared and effective approach is the "DRAFT" strategy to fight plagiarism by Sarfo and Asiamah (2016) and further refined by Sarfo (2018b). The practical strategy, whose DRAFT abbreviation is '**D** – Diligent attitude', '**R** – Referencing proficiency', '**A** – Academic writing skills', '**F** – Faithful in Academic Writing Ethics' and '**T** – Time management skills.' Such initiatives will help researchers and academics maintain academic integrity in research endeavours.

Furthermore, there is a need to increase African governmental funding, donor agencies, and institutional support for African-based journals to improve their integrity practices and peer-review quality standards. This support will also help African-based journals acquire plagiarism detection software licenses and training materials to support their work. Also, publishers in Africa should begin forging partnerships with organisations like universities, research institutions, and other tech industries that provide access to resources and expertise in high-tech plagiarism detection.

3. Conclusion

The fight to enhance the quality of African-based journals is an urgent and worthy call. The emerging challenge of dealing with artificial intelligence chatbots and high-tech plagiarism will compound these journals' existing difficulties. Nevertheless, African governments, universities, publishing organisations, donor organisations and other stakeholders must support initiatives supporting academic publishing integrity and the publication of quality research outputs in local journals.

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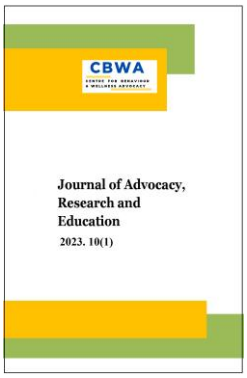

Articles

Supporting Youth Access to Research Dissemination through Digital Media: Analysis of Mental Health Impacts

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Abstract

Research outputs towards dissemination – such as journal articles and academic conferences – may be difficult to access for marginalized youth, despite the fact that engaging youth in this access can 1) help them equitably benefit from the existing research evidence-base while 2) mobilizing new generations towards research utilization and application. A pilot study was conducted to assess digital media as an alternative tool for disseminating research to marginalized youth. Specifically, this article focuses on the mental health implications of communicating research to marginalized youth via digital media. Grounded in the perspectives of marginalized youth themselves, the three-phase study includes an exploratory literature review, a first round of interviews (n = 5) to refine the interview guide, and a second round of interviews with marginalized youth (n = 8) for a pilot investigation. Mental health impacts are analyzed with six emerging themes, with findings below. First, youth self-censor and can experience constant fear even in expressing support for a piece of digital media. Second, youth report intentionally seeking negative emotional experiences via digital media for personal growth and development. Third, youth can successfully receive transformational knowledge via digital media; yet, the inability to communicate this knowledge to peers and the powerlessness they can experience from being unable to utilize this knowledge can result in greater isolation. Lastly, the intrinsic link between digital media and creation of online communities around a common interest could be further explored towards successful research dissemination and utilization in the future.

Keywords: digital media, education, marginalization, mental health, research dissemination.

1. Introduction

Research dissemination, the sharing of results after the completion of a research project, is a process that is primarily characterized by journal articles and academic conferences (Kerner et al., 2005). Participation and access to journal articles and academic conferences can often present certain barriers to younger generations, particularly for those who already face barriers to formal higher education institutions. This qualitative pilot study was conducted to understand alternative educational tools to support youth towards their equitable access to research outputs.

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Around the world, digital media is increasingly used within the classroom setting. Often combining multi-modal information of text, sound, image, and storytelling, the use of digital media to meet emerging learning needs has been reviewed even to the level of postgraduate education of medical professionals (Darbyshire, Baker, 2012). Although access to digital devices and the internet remains a barrier for some populations, the value of digital media can be seen in its application to reach multiple rural and remote communities simultaneously (Mindu et al., 2018). Additionally, youth often exhibit self-access behaviour towards digital media. A range of modern digital media, in the form of films, series, animations, games, and virtual reality, have all been applied towards formal use in higher-education institutions (Bui et al., 2021; Ghoman et al., 2020; Law et al., 2015). These forms of media attract youth to learn through creativity and emotional engagement. For example, games, as the tool commonly associated with "play", "entertainment", or "passing time", are one of the most well-studied tools, with an entire field of research dedicated to its educational application (Lateef et al., 2021).

Youth's motivation in self-accessing digital media, with the rise of digital media used in higher education, has positioned digital media as a potential platform for research dissemination. Gaps in research dissemination resulting in incomplete research utilization or application have been estimated to cost more than USD 760 billion (Shrank et al., 2019). Supporting youth in accessing research outputs mobilizes future generations towards making a difference with the existing evidence base while potentially empowering marginalized youth to challenge inequitable systems that lead to their marginalization. Communicating research outputs in digital media seeks to lower access barriers towards inclusivity and equal benefit from research across populations prone to exclusion by society.

Youth exhibit significant self-access behaviour towards digital media compared to their limited access to traditional dissemination products and formal education. This self-access behaviour can be so intense that it can be commonly studied as addiction (Paulus et al., 2021). Through an interdisciplinary literature review on Web of Science and Scopus, existing evidence on digital media as educational tools facilitated the creation of the *Collection, Action, Transformation, Emotion, and Recommendation* (CATER) inquiry framework. This article emphasizes the *Emotion* domain of inquiry, intending to explore the emotional and mental health impacts of digital media as educational tools - directly from the perspective of marginalized youth themselves.

The long-term goal of this pilot study is to support the development of digital media that communicates research information in a way that is sensitive to and potentially supportive of the mental health needs of marginalized youth. The short-term objective is to 1) provide an understanding of how digital media impacts youth mental health, specifically when digital media is being accessed as educational or informational tools, and 2) explore themes worth future inquiry from the perspective of marginalized youth.

2. Method

The pilot study was conducted with a three-phase structure under basic qualitative research (Merriam, Tisell, 2015). The interdisciplinary literature review was performed to establish focus and operational definitions for the pilot study. The intersecting domain between 1) digital media, 2) research dissemination, and 3) marginalized populations was assessed to evaluate existing research that touches upon all three key themes relevant to the investigation. The literature review helped to establish the operational definitions of the study as follows:

Digital media: includes films, series, animations, graphic novels, games, and virtual reality but excludes all non-fictional sources, which deserve a separate, future inquiry. All of the following are excluded from this pilot study to support manageable scope: social media; documentaries; news, and other outputs of journalism; research outputs which are digitized but are pure texts without other forms of information communication via images, sound, etc.

Research dissemination: includes dissemination of research across disciplines, as youth should be supported in their access to the full range of research society produces. For the purpose of this research, all bottom-up dissemination of research is excluded. This includes studies and projects which emphasize disseminating the voices of the community to policymakers, educators, health professionals, and other stakeholders. While this is an important piece of the cyclical nature of information exchange in research, this pilot study emphasizes improving access to research for community members, especially for youth experiencing marginalization.

Marginalized populations: the pilot study emphasizes intersectionality (hooks, 2000), recognizing that a single individual may face multiple barriers or identify with more than one marginalized group in society. For the purpose of the pilot study, all participants must meet the dual criteria of: self-identifying with 1) a barrier to formal education, as well as 2) a status of marginalization such as living as a racial minority.

Procedure

Phase I of the study is defined by the interdisciplinary literature review, which produced the CATER framework of inquiry for semi-structured interviews. The CATER framework is established as follows with accompanying rationale.

Collection: which particular pieces of digital media are youth already drawn to? What are their favourites, and which pieces of work have been the most useful, meaningful, or beneficial to their lives from their perspective? Why? The rationale of this as a domain of inquiry is to open up the conversation through what is of interest to the participants, as well as help the researcher understand the perceptions of utility and benefit of digital media from the perspective of marginalized youth.

Action: did digital media inspire youth to take action, and if so, what kind of actions did digital media inspire? This is central to the context of the long-term objective of the study, which is to support youth's equitable benefit from research outputs. The fact that digital media has the potential to inspire action beyond knowledge absorption serves to inform future investigations on how digital media can facilitate research application and utilization after the initial engagement.

Transformation: does digital media provide new information and new understanding beyond what youth already know? Does digital media have the potential to change the attitudes, worldviews, life goals, and decisions of the youth? If digital media is to be seen as a valid platform for communicating research information to youth, transformation or evidence of change after exposure to digital media is worth investigating. In other words, simply affirming what youth already know through digital media will not result in youth's equitable benefit from new research-based information.

Emotion: how does digital media impact youth's emotions positively and negatively? What do youth think about digital media's impacts on their own mental wellbeing? This is a key domain emphasized by this article. Emotion plays an important role in two ways. First, emotion has often been removed from research and academia in general as it is viewed as an uncontrolled factor impacting scientific neutrality. On the other hand, emotion is increasingly recognized as an important factor in the communication of research, to the point that emotional immersion and emotional engagement can be seen as indicators of validity in qualitative research (Finlay, 2006). Assessing emotion can help determine how engaged and absorbed youth are in the research-dissemination process. If, after receiving research outputs, youth exhibit a complete lack of emotion, this is potentially an indicator of unsuccessful engagement rather than definitive evidence for scientific neutrality.

Second, digital media can impact youth's mental wellbeing negatively and should be acknowledged as a potential negative influence. At the same time, digital media can provide respite and a safe space (Silver, Slater, 2019) for youth, especially marginalized youth who face stigma or isolation in their physical communities in contrast to their digital or online surroundings. The act of communicating research to youth should not negatively impact youth's mental wellbeing; this principle drives the CATER framework's investigation into youth's emotions and self-perceptions of emotions.

Recommendation: from the youth's perspective, how do researchers turn research outputs and evidence into good digital media? This final domain of inquiry seeks to directly assess what factors youth see as desirable qualities in digital media. Grounding the concept of "good" or influential digital media in the perspectives of marginalized youth themselves is critical, as the long-term objective is to engage this group as a valuable audience for communicating research.

Participants

Phase II of the study emphasized responsible and sensitive engagement of marginalized youth in research. Prior to the actual engagement of marginalized youth, preliminary interviews were conducted with individuals with qualitative research experience. The rationale for this phase of the study is to test and refine the interview guide and address any outstanding methodological concerns to minimize challenges when conducting interviews with marginalized youth.

Convenience sampling (n = 5) was performed with individuals, with the inclusion criteria of having prior experience as a qualitative interviewer. The shared characteristic of the sample engaged in this study is that all participants worked in the field of international development or rural development due to convenience sampling.

Phase III of the pilot study engaged marginalized youth (n = 8) in semi-structured interviews. Participants must identify with at least one barrier to formal education and identify with a marginalized group. All individuals identified with more than one barrier to formal education, including financial, geographic, familial, structural, and barriers related to discrimination. Seven individuals identified with more than one marginalized group. Representation among marginalized groups is listed as follows: caregiver of an individual living with chronic health condition or disability; personally living with a health condition or disability; personally experiencing or recovering from mental health challenge; a survivor of childhood abuse; racial minority; immigrant or forced-migrant; belonging to a rural or remote community; and experience with housing insecurity, homelessness, or street-survival. The final selected sample in this pilot study represented all groups above. Notably, while participants identified as belonging to different racial minorities, no participants identified as indigenous, suggesting the need for future research to apply intentional strategies towards the inclusivity of indigenous communities.

Individuals engaged were above the age of 18 and willing to provide informed consent without the need for a parent or guardian. Individuals were able to communicate in English, though English did not need to be their first language. Ethics approval for this pilot study was conducted through the University of Alberta, Canada.

Table 1. Participant Demographics, Composite Anonymous

Participant Demographics	**Phase II (n=5)**	**Phase III (n=8)**
Average Age	~34	~22
Ethnically Diverse	80 %	75 %
Self-identified Low SES	60 %	100 %
Self-identified with marginalization status	60 %	100 %

Data Analysis

Data analysis was performed through open coding to identify broad themes and through axial coding to confirm recurring themes. Additionally, datasets were analyzed with a time-progression lens. Phase II of the preparatory interviews illustrated that participants tend to disclose information on their interests and personal mental health near the end of the interview. Member checking was performed and validated this finding. Participants directly reported fear of judgment and feeling the need to provide the researcher with "academic" information. Both of these concerns inhibited participants from providing direct responses in the initial phase of the interviews. A lens of time progression throughout the interview transcript helped gain insight into participants' perceptions and comfort levels to inform the *Emotion* domain in the CATER framework. In addition to open coding, axial coding, and time progression, the multi-phase study design of the pilot allowed for comparing responses from international development researchers in the preparatory Phase II and marginalized youth in Phase III.

3. Results

The results of the pilot study in relation to mental health are outlined below, particularly emphasizing unexpected findings or findings which provide nuance to common perceptions of youth and digital media. Data is organized into primary themes as follows:

Addiction to Digital Media

Participants were open to acknowledging addiction. However, views on addiction differed, with an additional layer of discussion on control or autonomy. The perspectives of marginalized youth confirmed that addiction to digital media could be distracting or inhibiting them from what would benefit them in the real world. Conversely, participant responses also supported that an extended time spent engaging with digital media is not automatically considered an addiction – if they intentionally chose to spend that time. In other words, they had control over when to start and stop, and the engagement length was intentional to suit what they felt was needed in their lives. This suggests that control and self-control could be better understood from the perspective of the youth themselves. When prompted if the participant's conceptualization of addiction changes if they were distracted from real-life duties due to their intentional prolonged engagement, participant responses showed another layer of nuance:

"*Yes, even if I do not do something, I choose it that way. I know I'm not in the right mindset yet. Even if I stopped watching something and went to work, it doesn't mean it's good work, and I'll have to re-do it anyways*." (Participant #4, Phase III)

The data suggests that digital media can be applied by the youth to prepare themselves to be in the right mindset for real-life tasks. This finding is corroborated even by participants who acknowledge losing control of their engagement in digital media. A participant reports that the value of digital media is that it provides *predictability* in one's life. In other words, by engaging in a digital game, the participant knows exactly what actions will produce what outcomes in the experience. From the participant's perspective, this, in turn, creates assurance and a sense of safety when life is full of circumstances beyond their control.

In the context of living as a marginalized youth in society, predictability can be viewed in relation to the concepts of autonomy and control. Participants also report that real life starkly contrasts the world presented in digital media.

"*You can work and study, but still not get a job. Games aren't disappointing like that, though*." (Participant #8, Phase III)

In other words, the real world can make promises to marginalized youth but not keep those promises unless they fit the mold of being not marginalized (Nicholls, 2011). Digital media, in a sense, provides an alternative dimension in which marginalized youth feel rightfully rewarded for their labour. Even if the rewards are virtual, the sense of being able to complete a task and receive a justified result can be comforting. These experiences perhaps help youth to self-medicate with the idea that life will eventually work out the same way too, or these experiences can simply help take youth's minds off the actual injustices they face in real life.

The most unexpected result under the *Addiction* theme is the participants' openness to acknowledge and engage in discussion around media addiction. The semi-structured interview guide does not include an active probe to assess addiction in case it is perceived as disrespectful or judgmental of marginalized youth. When marginalized youth present a relevant concept, the researcher probes. Ideas related to addiction were naturally present in the responses of 5 out of 8 participants. All participants did not shy away from probes on this topic, suggesting that marginalized youth may have more self-awareness and self-reflection on this issue than previously conceived by the researcher. Most importantly, the intricate relationship between addiction and the level of control or autonomy society gives marginalized youth deserves further investigation. Autonomy and control are essential to mental or emotional health and have been extensively studied in impacting physical health (Garces-Ozanne et al., 2016). The use of digital media to provide a virtual space for this autonomy may have applied value. Within digital media, youth can experiment with the autonomy they are denied in real life.

Pain of Critical Consciousness and Learning

Unlike addiction, *Pain* and negative emotions were intentionally probed by the interview guide under the CATER framework. The rationale is to provide a balanced perspective which does not prioritize the positive impacts of digital media. Even though significant research directly applies digital media in clinical practice for therapy (Garrido et al., 2019), the pilot conceptualized a balanced approach as participants are not accessing digital media under the therapeutic practice of a health professional. Participant responses on negative emotions ranged from the basic shying away from certain genres like horror or crime, to extremely personal and complex reflections. A notable theme is that while participants acknowledge negative emotions stemming from digital

media engagement, this does not prevent them from continued self-access. For some participants, this actually promotes their self-access.

The paradoxical observation of accessing digital media in search of negative emotions is difficult to disentangle, with a wide range of different responses that emerged from the youth's perspective. Primarily, participants expressed interest in learning more about the real world and its potential tragedies. Putting this kind of learning in a work of digital media creates a certain distance and shaves off parts of the hard-to-swallow realism. In the words of one participant, learning about terrible events through digital media helps "soften the blow". The application of this finding is specifically relevant to the context of the pilot study. In supporting youth towards equal access to research outputs, society should consider how much emotional burden can come with learning new information - particularly about health inequalities, social injustices, and systemic oppression that are relevant to the lives of marginalized youth. The process of learning and self-realization can come with significant emotional struggle, as noted by hooks (1994, p. 43) in her experience with the classroom context. Compared to classroom-based and academic sources of research dissemination, presenting research via digital media could potentially detract from the factuality of the information. Yet, from the youth's perspective, this alternative format could better support their mental health while absorbing new information relevant to their lived experience.

For another participant, the act of seeking out negative emotions is the process of "working on myself". This finding is echoed by clinical practices in mental health (Siehl et al., 2021): exposure to negative experiences can be a way to overcome prior traumatic experiences. Here, digital media presents a virtual space in which participants have a degree of control over how much exposure they need - in order to feel they are empowered to overcome personal challenges. If a piece of digital media is too overwhelming, they can simply turn off their devices and cease engagement. The most significant implication of this finding is that marginalized youth are self-accessing digital media with the potential intent to better their lives. Just like how privileged youth can easily access formal educational opportunities or paid health services to better their lives, digital media presents a lower-barrier and arguably lower-cost alternative for marginalized youth. Digital media may also be lower-efficiency in comparison to formal education or formal health care, but it is a solution that marginalized youth can access with a certain degree of self-autonomy and limited penalties on their finances.

Despite the fact that participants report seeking out negative emotions in digital media intentionally, not all responses in the *Pain* category suggest benefit. Participants also reported that accessing certain types of digital media can make them feel mentally exhausted or emotionally drained, yet in these cases, the youth are in power to cease engagement. On this point, participants reported discontinued access to certain works that they knew would be overwhelming or triggering. In general, the fact that participants continue to access certain media that bring negative emotions means these negative emotions have some perceived benefits - and are not crossing the emotional limits participants have set up for themselves. The presence or absence of continued self-access behavior is a choice participants have control over. In non-formal learning settings, youth are not required to engage in any piece of digital media they do not want to. Assessing negative emotions in light of *addiction* as the first theme illustrates a common link to the concept of autonomy: digital media can provide choices marginalized youth cannot have in the real world.

Self-Expression via Digital Media

This theme is cross-analyzed with another domain of inquiry in the CATER framework: *Action*. Participants reported specific actions that were catalyzed by their engagement with digital media. Many of these actions reported by participants are related to creative endeavours; all eight participants either have a creative output they are working towards or respond positively to having an idea of future work. The stigma of not having a voice in society or feelings of being unheard can impact mental health on multiple levels (Loades et al., 2020). Understandably, marginalized youth may not always find physical platforms or opportunities in their local community to share their thoughts or lived experiences. Participants do not directly make the link between creativity and mental health, but some responses suggest an inherent, inseparable connection:

"*I just need to. If I don't get creative for a long time, I actually go mad. Writing will always be a part of me*" (Participant #2, Phase III).

In this particular response, youth's engagement with digital media is not just as a consumer or passive observer but as a creator. In the context of the pilot study, it must be acknowledged that

marginalized youth becoming creators of digital media will not support their increased access to research outputs. Even though digital media creators may self-access more digital media content to improve their skills, this link to increased access to information cannot be assumed without further evidence. Significant research supports digital media creation as a form of bottom-up research dissemination, in which community perspectives, compiled via qualitative research methods, are disseminated to policymakers and other stakeholders. In fact, through the Phase I literature search, this bottom-up research dissemination constitutes the majority of existing research on the intersection between digital media and research dissemination (Cabitza et al., 2016).

Participant responses show that there is a significant inclination of youth towards creating their own digital media while acknowledging the potential harms of this journey. This self-expression through digital media may help youth feel acknowledged and accepted, that their lived experiences and perspectives are worth sharing, and that they are contributing to a community of creators. All of these can have positive impacts on mental wellbeing. Likewise, participants acknowledge that some of their goals are unrealistic - that they might be working towards "something that may never happen," according to one participant. Other participants have creative aspirations that they acknowledge are "big," but they remain optimistic. In other words, the act of being heard is not guaranteed just because they have embarked on these creative journeys. After the end of their creation, they may continue to feel censorship or marginalization. A focus group setting in the future may help to encourage more in-depth discussions on how much of this impact is disillusionment versus much-needed hope while being marginalized in a real-life context of hopelessness.

Fear Stemming from Engagement with Digital Media

Intrinsically, *fear* is a common theme that was visible through Phases II and III. This theme is implicit, and engaging participants in the discussion of fear proved difficult. However, member checking was performed successfully to validate this concern: participants, marginalized or not, can experience fear in expressing their support for a certain work of digital media. Participants expressed that at the beginning of the interview process, they tend to disclose what is generally accepted and liked by the public – or even attempt to guess what the interviewer may like. This was not necessarily an effort to build a common language but rather a fear-based response. Indeed, it can be emotionally damaging to have a piece of media one holds dear to one's heart be judged or rejected; the resulting impacts on the validity of interview data would benefit from future investigation. Participants were willing to engage in discussion of generally popular works, even at great lengths, before disclosing their actual favorite pieces of digital media.

Researchers and interviewers need to exercise additional care and sensitivity to collect valid data on digital media and mental health. Additionally, the academic setting on its own may be a source of pressure that directs participants towards what they deem as socially acceptable or academically acceptable responses. It is important to note that none of the participants' responses on their favorite pieces of digital media would be considered socially unacceptable. There were no works involving sexually explicit material, graphic violence, or illegal activity in the responses. Still, participants' personal favorite works were not disclosed until the later segments of the interview process.

This illustrates perhaps a constant background concern affecting the mental wellbeing of marginalized youth who engage with digital media. Whenever a youth develops a liking or some form of support for a piece of digital media, that youth needs to be prepared to be judged by society for this support. The most unexpected finding in relation to this theme is how prevalent and how severe the impact can be. One participant describes that before disclosing their interests in digital media - even in a completely anonymous online setting - the participant prepares initial probing questions to assess the other person's interests first. If the response received is negative, the participant describes keeping certain pieces of digital media strictly off-limits in future discussions with the other person. In other words, the mental health impacts are deemed impactful enough to warrant preconceived communication strategies.

The theme of *fear* highlights two important questions. Firstly, what is socially accepted, or what we call mainstream? What society has promoted as mainstream is not always only the result of public support; corporate marketing cannot be eliminated from the discussion of what receives public exposure (Prag, Casavant, 1994). Digital media, in previous thematic inquiries, seems to be a virtual realm in which marginalized youth can find respite from real life. Through probing into the theme of *fear*, the real world is shown to invade digital media as a safe space once

again. Youth report the need to respond to what is socially acceptable or popular, as determined by the larger community, to avoid stigma.

The second question worth considering is: How much pressure are marginalized youth facing in online communities? This question is especially relevant in light of numerous studies on cyberbullying (Tokunaga, 2010). While digital media is a decidedly personal engagement, youth still need to face the presence of a digital or online community that may not fully support their passions. In applying digital media to research dissemination, the potential introduction of digital media with research-dissemination intent may produce changes in the landscape of digital media and public acceptance. This, in turn, can have future impacts on the mental health of marginalized youth if digital media designed to disseminate research is perceived as unpopular among society – or among privileged youth.

Others: Community, Relationships, and Socializing

In relation to the theme of *fear*, the theme of *others* emerged only when the researcher allowed participants to discuss non-fictional digital media. Non-fictional sources are not included in the scope of this pilot study, but participant responses generated unanticipated findings of new gray areas. Previously, the primary gray area identified by the researcher was documentaries, which were decidedly removed from the scope of this pilot and reserved for future investigation. However, the pilot study with marginalized youth would illustrate new gray areas between fictional and non-fictional content, namely, *online communities* and *derivative content*.

Online communities are no longer limited to traditional conceptualizations of a chatroom or internet forum. Marginalized youth may be drawn to content-creating online communities such as *Games Done Quick*, an organization that streams gameplay videos with the dual intent of 1) breaking a world record for the shortest completion time while 2) raising funds for non-profit organizations (of note. *Games Done Quick* is known for raising awareness and funding for youth and mental health causes). The significance of online communities can be illustrated by not just the number of subscribers or participants these communities can gather but also by the sheer dollar value of donations they have generated (Sher, Su, 2019). Participant responses illustrate that youth are drawn to communities as such because they present a place where youth can find people sharing similar interests. Not only so, but the following was also reported to have a specific, positive impact on mental health: participants described that watching other people "have fun," "laugh," and "enjoy each other's company," even if merely in digital form, provided a positive and heart-warming experience.

This has wide implications for the mental health of marginalized youth and raises several questions. Do marginalized youth enjoy watching streamed content from online communities simply because it is simple to access - as in, it is a video they can play in the background while completing other formal tasks (akin to listening to a friendly radio conversation in the background)? Or do marginalized youth enjoy watching online communities because they can observe without physically being present in this engagement, thus never exposing themselves to potential judgment from real-life people? Alternatively, are marginalized youth's immediate surroundings so alienating that these online communities might be the best source of friendship – virtual or not – that they could find? These considerations are linked to participant responses on *fear*, as engaging with online communities can be seen as a way to have one's interests supported, validated, and even collaboratively celebrated to dispel those concerns.

This concept of online communities is directly linked to another unexpected gray area: *derivative content*. Derivative content can take many forms, some of which are directly reported by participants as beneficial enough to self-access. First, derivative content can be a reaction video, in which content-creator films themselves watching a movie or other piece of digital media while expressing their feelings on camera for the world to see. A second form of derivative content is a review or analysis. Unlike traditional written forms, these can take many creative manifestations, such as video essays or new, fan-created sequels. Thirdly, participants also expressed interest in non-fictional derivative content related to authors, directors, artists, and other digital media creators they support. These include biographies, public speaking recordings or interviews, and behind-the-scenes creative processes - all of which participants report as informational and inspirational. In other words, after engaging with digital media, participants exhibit self-access behaviors for more relevant information. This desire to access relevant information is no longer limited to accessing fictional information but also real-world information - which youth also perceive to be beneficial. The act of seeking out derivative content allows youth to build a greater

connection to people, such as the original authors or creators of derivative content on digital media they enjoy.

The emerging concept is that a clear delineation between fictional versus non-fictional media, while useful for a research study, does not exist in a binary in the youth's experience. Digital media, for some participants, is intrinsically linked to sources of information and engagement that is decidedly non-fictional. The implication for future studies is that limiting discussions may result in incomplete narratives that sever participants from individuals who inspire them. In the context of the research-dissemination objective of the pilot, the theme of *Others* provides significant new directions for exploration. Can a piece of digital media, co-created by researchers with the intent of disseminating research, give rise to an online community? In turn, can the resulting online community impact the mental wellbeing of marginalized youth and bridge them to real-world contacts and opportunities for greater empowerment?

Isolation: Physical and Mental

The theme of *isolation* in this context refers to increased loneliness or stigma as a result of engagement with digital media. Also linked to the theme of *fear*, *isolation* is present when marginalized youth find themselves unable to establish a common language with others after engaging with digital media. This is beyond what might be described as social awkwardness, but rather, a growing passion for a specific area of interest where they begin to find no peers. As one participant puts it, the worst part of digital media is the ever-present loneliness. When youth access digital media - and the engagement presents them with new ideas towards transformative learning - this alone can create a chasm between themselves and others who have not been exposed to the same ideas. For this part of the research, the interviewer probed precisely for the kinds of new learning that led to feelings of isolation.

Participant responses to the probe are difficult to encapsulate, suggesting that many of the ideas leading to participant feelings of isolation indeed cannot be effectively communicated by language alone. These responses present an intersection of passions towards psychology, metaphysics, and philosophical concepts they gained from digital media, passions which are compounded by their personal perspectives and past experiences. This suggests that digital media engagement can communicate research-based information at a depth that surpasses rote and fact-based learning while inspiring new lifelong interests among youth. At the same time, when youth find themselves incapable of sharing these interests with others, the isolation drives them towards more digital media engagement in a cyclical pattern. In the context of research dissemination, the theme of *isolation* provides a mental health warning. When research is successfully disseminated via digital media, society must be ready to arm marginalized youth with support such as language, peers and leverage points in their lives to use or share the new knowledge. Simply increasing access to knowledge, though conceptually more beneficial than limiting access, also comes with the risk of increased feelings of isolation or even powerlessness for already marginalized youth.

4. Discussion

This pilot study's results suggest significant depth to be explored beyond media addiction or media-as-violent influence among youth. Other key uncategorized findings and unexpected findings are summarised below. First, some participants exhibit an interest in engaging the interviewer in intellectual debate - which is outside of the scope of the research study. As part of the interview standard, the interviewer does not bring in opinions, with one exception: positively acknowledging digital media reported by participants as valid for the interview. Regardless, participant responses indicated an interest in presenting perspectives which are meant to challenge the interviewer's questions. Whether this is an expression of their reaction to a potentially unequal power relationship or an expression of general discontent with injustices in society requires more investigation. Member checking was conducted in a mild, non-confrontational manner. Participant responses suggested they did not mean harm, but simply wanted to engage in a two-way discussion with the interviewer. This is a particularly notable finding: instead of assuming marginalized youth are prone to bringing challenging responses in general, the conceptualization of research as a one-way conversation may not be conducive to collecting data on the mental health impacts of digital media. Potential future research directions may test alternative engagement strategies, including

participatory action research (Kemmis, Wilkinson, 2002), in which participants are naturally positioned towards two-way or collaborative dialogue.

A key finding is that 6 out of 8 responses specifically mention past trauma in their responses. Participant tendencies to disclose trauma during the interview may result from the intake survey, which included an option for participants to identify as survivors of past abuse. Still, to keep the qualitative interview within the scope of digital media as educational tools, no questions and no probes were used regarding trauma or abuse. The pilot study showed that discussions on digital media can draw out responses that relate to trauma. In future studies, researchers should be well-prepared for these discussions to arise. The participants' willingness to disclose such information may also be interpreted as an indicator of trust. In building true equal-power relationships between researcher and participant, the pilot strongly suggests value in multi-interview engagement. Sharing one's past trauma for a one-time engagement, only for the researcher to move on to the next participant, does not seem apt if the mental health of marginalized youth is a priority.

Relevant to this finding is the high level of interest in post-interview engagement. When participants were asked if there was any information they would like to add or if they felt there were any questions the interviewer should have asked, all participants responded negatively. This was an unexpected finding. Yet, when the interviews came to a close after that final question, all interviews continued, including one that reached another fifty minutes of engagement. This suggests that the personal nature of engagement with digital media may not be well-suited for an interview process. When the participant perceives that their main task of the interview is done, they are willing to share and actively share more insights. The participants may have internally conceptualized these insights as irrelevant. Initially, the researcher questioned if these post-interview responses were provided due to the participants' intentions of keeping them off the interview transcript. Member checking indicated that participants were willing to keep post-interview material as part of the official interview. In other words, the post-interview responses are potentially what the participants have wanted to express all along, which surfaced after they felt they had accomplished the task set out for them.

5. Limitations

This study was conducted with a small total sample ($n = 5$ and $n = 8$) as a pilot for preliminary investigation. The engagement involved member checking but would benefit from iterative, multi-session engagement in the future. The intake survey illustrated a gap in engaging marginalized youth who identify as indigenous. Furthermore, sampling was restricted to individuals with a high command of English. Thus, this exclusion suggests that while individuals with disabilities are represented in the sample, individuals with neurological or developmental conditions affecting communications were not successfully engaged. Including individuals with diverse disabilities and learning needs will be highly desirable for future research toward understanding truly equitable dissemination of research to marginalized youth.

6. Conclusion

This pilot study assesses marginalized youth's perspectives on digital media as a tool for research dissemination – with the goal of supporting equitable access to research outputs and associated benefits. Specifically, this paper focuses on the domain of inquiry on mental health impacts, with key presentations in six themes: *Addiction*, *Pain*, *Fear, Self-Expression, Others*, and *Isolation*. The results suggest that marginalized youth can be self-aware of their addiction, which they not only openly acknowledge but exhibit self-control behavior over. Their prolonged use can be a response to finding some sort of autonomy and control, especially when society denies them both. Youth experience negative emotions and, paradoxically, choose to access digital media in pursuit of these negative emotions as part of their learning and development process. Again, this engagement is under the control of the youth themselves, as they also report directly shying away from certain pieces of digital media that cross their emotional limits.

All participants, including non-marginalized participants from Phase II, expressed fear of judgment regarding the pieces of digital media they enjoy. This is a constant concern with complex ties to societal views on what is mainstream or acceptable digital media. Digital media can arm youth with a voice and a creative outlet to share their lived experience when society does not grant them other platforms. Similarly, this potential outlet can lead to unrealistic expectations of

becoming a digital media creator, as well as the possibility of future disappointment, as noted by the youth. Youth report themes beyond the pre-conceptualized scope of the study, suggesting definite mental health impacts from digital media in the form of related online communities and derivative content. Lastly, digital media may exacerbate the isolation experienced by marginalized youth, especially after digital media has given them access to new knowledge and perspectives with no means to utilize these new insights. Finding like-minded peers and support is not something digital media alone can offer - but a research community dedicated to the inclusion of marginalized youth can.

7. Declarations

Ethics approval and consent to participate

Ethics approval was completed through the University of Alberta, with informed consent from all participants.

Consent for publication

Not applicable.

Availability of data and materials

Please contact the author for data and materials associated with this study.

Conflict of interest statement

The author reports no conflicts of interest.

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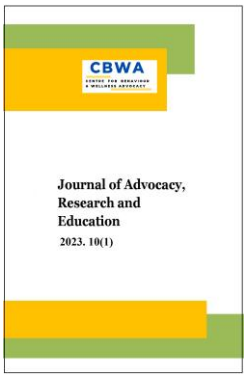

A Cognitive Stance to Enhance Learner Information Processing Ability in the Classroom: Structural Equation Modelling Approach

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Abstract

The purpose of this study is rooted within the post-positivist research paradigm and aimed at enhancing learner information processing ability in the classroom through the application of structural equation modelling (SEM) analysis. Despite previous years of good educational practice, it is evident from academic results that learners fail to engage in meaningful learning experiences in most South African classrooms. Solutions to teaching and learning problems in education today require a more sophisticated and complex approach. The dynamic merging of the fields of neuroscience, psychology, and pedagogy explores effective teaching and learning practices in light of current knowledge about the brain, learning processes, and factors that influence successful learning. This study employed a closed-ended questionnaire as the data collection instrument. The sample of the study included 650 Grade 11 learners that represented 20 schools of the 65 schools in the Fezile Dabi education district. Data gathered through a non-experimental quantitative design, following the survey method, was analysed through the application of inferential statistics. The main findings of the study illustrated a statistically significant relationship between the information processing ability of learners and conscious awareness, cognitive engagement, and metacognitive engagement. Teachers should take special interest in the study of the brain (i.e., from an educational-neuroscientific stance) because they should understand how the brain contributes to educational phenomena, such as learning, critical thinking, problem-solving, information processing and memory.

Keywords: brain-based education, cognitive processes, educational neuroscience, information processing, learning processes.

1. Introduction

Effective teaching requires teachers to take cognizance of how the brain processes information and how learning happens and are encouraged to deepen their knowledge in Mind, Brain and Education (MBE) science (Sarrasin et al., 2020). Furthermore, teachers must be efficacious to impact learning (Van der Merwe, 2013), which is strongly correlated with knowledge of the brain and memory systems. It may require teachers to have a scientific understanding of how learners learn and process information, where teachers are required to create engaging learning experiences that entail more art than science. In this vein, pedagogy refers to the art and science of teaching, where pedagogy serves as a cornerstone in which effective teaching regards instructional

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design and creating curricula that build on learners' previous knowledge and understanding to more metacognitive engagement (Bhowmik et al., 2013). Teachers must be the creators and transferors of enriched learning experiences, evident in teaching learning interactive environments (TLIE), where learners are metacognitively engaged in learning (Fourie, 2019).

It is evident from academic results that learners do not succeed in engaging and meaningful learning experiences in most South African classrooms. Education is not a 'one-size-fits-all' practice following a recipe approach. Teacher practices and learning approaches seem to fail the facilitation of learning and the transfer of learning across real-world contexts (Stenger, 2017). This could be partially attributed to the fact that teachers lack the necessary knowledge about the learning brain. Echoed by Whitman and Kelleher (2016), teacher quality is the most influential element of learner outcomes, and the application of a pedagogical approach informed by MBE sciences acts as the missing resource. The field of MBE science is directly aimed at how the human brain process information and provides some scientific insights into how the brain learns. There is a need to balance teaching and learning, and as Blakemore and Frith (2008: 118) explain, "We know a little of what goes on in the brain when we learn, but hardly anything about what goes on in the brain when we teach."

Teaching should be evidence-based and research-based, and he regards MBE sciences to be the most innovative thinking being applied towards the enhancement of teacher quality and student achievement today. According to Whitman and Kelleher (2016), teachers are brain changers. Teachers are indeed not neuroscientists, but they are surely regarded as brain changers since they are in one of the few professions that are responsible for changing the brain daily (i.e., learning). Furthermore, the teacher's conceptualization of knowledge greatly impacts his or her pedagogy, which in turn affects learners' epistemological beliefs (Lee et al., 2013). Limited integration and evidence of MBE sciences into teaching pedagogies exist. If teachers are expected to create engaging learning experiences for learners in effectively facilitating the transfer of learning, they should, perhaps, have a scientific understanding of how learners learn. If teachers do not understand how the brain is wired for learning, optimal pedagogies and teaching practices focussing on active learning and the transfer of learning across real-world contexts could be absent.

Voss, Thomas, Cisneros-Franco and de Villiers-Sidani (2017), similarly clarify that neuroplasticity is the brain's amazing capacity to change and adapt. It refers to the physiological changes in the brain that happen as the result of our interactions with our environment. From the time the brain begins to develop in utero until the day we die, the connections among the cells in our brains reorganise in response to our changing needs. This dynamic process allows us to learn from and adapt to different experiences. In the same vein, Shaffer (2012) indicates that neuroplasticity can be defined as the natural tendency of the brain architecture to shift in negative or positive directions in response to intrinsic and extrinsic influences. Strong connections exist between fluctuations of emotional states and brain functions. Inevitably, meaning is attached to the interrelatedness of neuroplasticity and positive psychology based on Shaffer's (2012) findings, where research on neuroplasticity considers the several ways in which positive psychologists can facilitate brain plasticity in a positive direction at any age.

Dehaene and Changeux (2011) claimed that "human cognitive neuroscience has made enormous strides in understanding the specific cerebral circuits underlying the particular domain of education, such as mathematics, reading, and language acquisition". Correspondingly, Galaburda (2011) states that "knowledge from neuroscience also lends itself to applications to education and I would hypothesize that the predictive value of neuroscience data to learning is opt to be greater than that of genetic data". Feist and Rosenberg (2012) explain that studies have indicated that learning and memory contribute to neuroplasticity, which in turn regards the significance of early brain structure and functioning development. Frith (in Lalancette, Campbell, 2012) further argues that educational neuroscience is evolving at the interface of neuroscience, cognitive sciences, and education. The authors argue that even if education focuses solely on enhancing learning and neurosciences solely on the brain mechanisms involved in learning, the future of education and the neurosciences are inextricably intertwined, and educational practices are being and will continue to be transformed by science.

Tandon and Singh (2015) indicate that two main streams of knowledge link neuroscience to education. The first knowledge stream claims that the brain structures are responsible for various educational processes like reading, attention, memory, calculation, and language acquisition. The

second stream of knowledge regards the manner in which educational processes affect brain structure and function. Over the last few years, extensive research has demonstrated the role of these educational processes in learning, specifically in literacy and education. For instance, learning to read is also one of the most elegant examples of the neuroplasticity of the brain. While brain research may not yet tell us how to teach per se, it does inform teaching, learning, and school reform. We are at the beginning of a new vision in which scientists, educators, and hybrid educational neuroscientists can all work together toward school reform (Zadina, 2015). In order to be able to attend to the educational needs of the diverse groups of learners in modern society, Tandon and Singh (2015) indicate that teachers need to adjust their teaching knowledge from brain research.

Similarly, Jensen (2008) avows that understanding how the brain learns and applying relevant scientific insights and research about the brain is the single most powerful choice teachers can make to improve learning in the classroom. The aim of this study was to consider what research conceives of how efficient information processing (i.e., learning) could result in meaningful learning and understanding by the learner. Without focused attention and memory, there is no learning. The study further attempted to enhance learner information processing ability (IPA) in the classroom through the application of SEM analysis. Data gathered through a non-experimental quantitative design was analysed through the application of SEM. The study attempted to fill the existing gap in the scientific literature on how to enhance the IPA of learners by focusing on learner cognitive behaviours.

Theoretical Framework

The study encapsulated the theoretical framework of MBE science, which is regarded as the 'new' brain-based education. New and emerging research in neuroliteracy provides tremendous insight into how humans learn and subsequently how we should teach. The field of MBE science conspicuously informs teaching and learning practices and serves as a horizontal collaboration that integrates the work of clinicians, neuroscientists, and educators towards understanding aspects of memory, neuroplasticity, and how humans learn. MBE science initially integrated cognitive neuroscience and developmental psychology but then also incorporated education through educational psychology and educational neuroscience (Tokuhama-Espinosa, 2011a).

The MBE science framework was originally established by Tokuhama-Espinosa (2008) and introduced as the scientifically substantiated art of teaching. The fields of neuroscience (i.e., the brain and its functioning), psychology (i.e., the mind and behaviour), and education (teaching pedagogies) are scientifically brought together to inform teaching and learning from evidence-based practices (see Figure 1). In her article 'Why Mind, Brain, and Education Sciences is the "New" Brain-Based Education', Tokuhama-Espinosa (2011b) explained that MBE science is a paradigm shift in our understanding of the teaching profession.

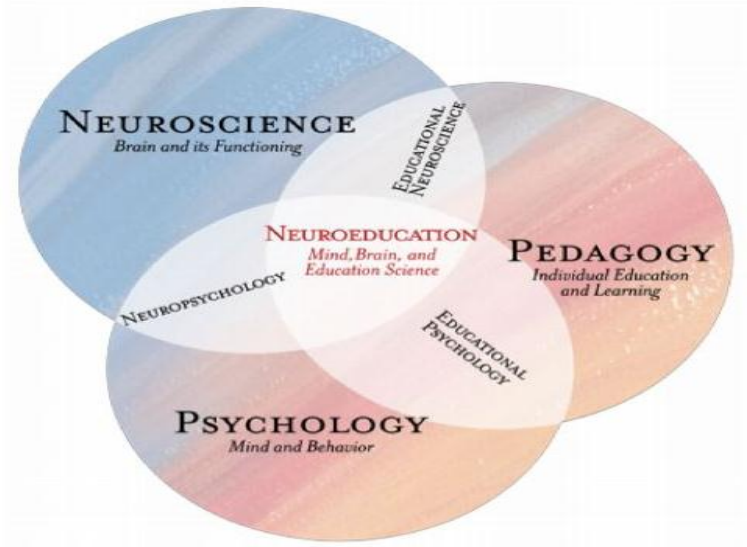

Fig. 1. The Scientifically Substantiated Art of Teaching (Adopted form Tokuhama-Espinosa, 2011b).

The transdisciplinary field of Mind (psychology), Brain (neuroscience), and Education (pedagogy) science deliberately seeks to enhance knowledge of the brain and how it learns. It also aims to inform pedagogical practices articulating the changing teacher profile in the 21st century that requires a new set of skills and improved knowledge of the human brain and underlying cognitive processes (Guerriero, 2017). The transdisciplinary nature of MBE is rooted in the origins of history, philosophy, and epistemology, becoming its own academic discipline (see Figure 2). The framework illustrates how learning sciences are encapsulated in the main disciplines (psychology, neuroscience, and education), and subsequently, each combination is an interdisciplinary field grounded in the history, philosophy, and epistemology of each. MBE science advocates that all three fields share an equal academic hierarchy, and the focus is not only on teaching or learning but rather on "the teaching-learning dynamic" (Tokuhama-Espinosa, 2017).

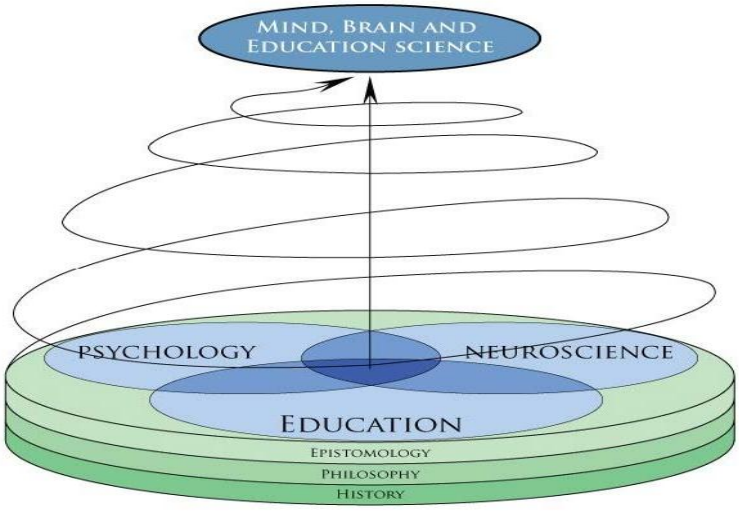

Fig. 2. The transdisciplinary nature of MBE Science

Canosa and Ruano (2019) explain that the transdisciplinary nature of MBE reflects the coordinated interaction between these disciplines, where knowledge is produced in a process of reciprocal learning without any hierarchy towards the resolution of certain complex problems. The main objective of a transdisciplinary approach is to achieve the unity and unification of knowledge. Lemon, Lambrechts, Fleming, and Lee (2016) point out that a key element of a transdisciplinary approach is that it provides a basis for critical reflection on research in education for sustainable development. This MBE transdisciplinary approach enables innovation to existing problems in education and offers evidence-based solutions for the classroom. Tokuhama-Espinosa (2011a) affirms that this vision encapsulates the different histories, philosophies, and epistemological lenses through which these shared problems in the separate fields are approached.

Samuels (2009, p. 46) contributes to the transdisciplinary nature of MBE by stating that "Transdisciplinarity is a perspective on knowledge creation that integrates disciplines at the level of a particular issue. It is an approach ideally suited for finding complex solutions to complex problems." The challenges that emanate from this approach are that new MBE professionals have to (i) accept the different historical roots of the three disciplines (neuroscience, psychology, and education), (ii) recognize the philosophies included through which each of these three disciplines views the world, and (iii) understand how these histories and philosophies explain and embrace different epistemologies (Tokuhama-Espinosa, 2011a). In precis, it is therefore essential to adopt thinking across academic disciplinary lines, merging understandings from different fields, to solve the complexity of the pedagogical challenges for teaching 21st-century skills.

Information processing ability of learners

Kim and Lee (2014) espouse the idea that it is more useful for learners to select knowledge and information by thought than to simply memorise what is provided to them. Learners should possess more than simply a quantity of knowledge (i.e., how much they know) but possess information-processing abilities instead (i.e., new knowledge can be constructed using existing

information – this is ultimately what teachers should be developing in interactive teaching and learning environments).

Conscious awareness (CA) in the classroom

Kuldas et al. (2013) state a conscious learning process starts by deliberately paying attention to instructional materials, noticing similarities and differences between words and their particular meanings with the help of relevant prior experience, thereby mentally building coherent connections between them and organising them into new knowledge structures. Thus, either conscious or subconscious learning is primarily a combination of mental processes, referred to as a knowledge acquisition process, bringing memories into the mind, forming associations, retaining, and using them (Mayer, Moreno, 2003). Kuldas et al. (2013) uphold that the subconscious can conduce to the acquisition, access, and application of knowledge without deliberate and controlled attention. A permanent change in mental associations in long-term memory or a potential change in human behaviour is considered to be learning (Ormrod, 2008). Neuroscience is beginning to provide evidence for many principles of learning that have emerged from laboratory research. It shows how learning changes the physical structure of the brain and, with it, the functional organisation of the brain (Bransford et al., 2000).

Cognitive engagement (CE) in the classroom

Van Amburgh et al. (2007) postulate that the concept of learner engagement and active learning is becoming more than just educational rhetoric. Active learning techniques have emerged as strategies for teachers to promote engagement with both discipline material and learning. The next section focuses on metacognition, a strategy that refers to our knowledge about attention, recognition, encoding, storage, and retrieval and how these operations might be used to achieve a learning goal. Metacognitive knowledge develops with age, experience, and instruction and has a profound influence on classroom practices (Schneider, 2008). Effective teaching strategies must consider learners' stages of cognitive development, the status of their consciousness in learning, and their metacognitive ability awareness. Solis (2008) agrees that teachers need to teach for engagement, and from education literature, it becomes evident that learner engagement is a prerequisite of learning, and for learning to be truly meaningful, learners have to be cognitively engaged. Van Amburgh et al. (2007) postulate that the concept of learner engagement and active learning is becoming more than just educational rhetoric.

Metacognitive engagement (ME) in the classroom

Human learning is ultimately made possible through the information processing theory. Because of the information processed, higher-order thinking occurs, which involves metacognition. As Schneider (2008) explains, teachers need to understand the information-processing model to teach effectively for metacognitive awareness among learners. Research suggests that teachers have a significant role to play in raising learners' metacognitive awareness (Price-Mitchell, 2015). Cubukcu (2009) elaborates that researchers argue that the capacity to self-regulate is central to our assumptions about learning, decision-making, problem-solving, and resource management in education and that they are researching assessment instruments and intervention programmes to promote self-regulation and make learners use their metacognitive strategies.

2. Materials and methods

This study is ensconced within the post-positivist research paradigm. Data gathered through a non-experimental quantitative design, following the survey method, was analysed through the application of descriptive and inferential statistics. The latter inspired the authors to conduct a quantitative research study by employing inferential statistics to provide insights into the cognition of learners from a scientific stance. The target population comprises all the Grade 11 learners in the Fezile Dabi Education District of the Free State Province in South Africa. A probability sample for this study was selected through a multistage cluster-sampling procedure, which involves the selection of respondents in naturally occurring groups existing in two or more levels or clusters. Multistage sampling was conducted by selecting 20 schools (urban and rural) in the district during the first stage using stratified sampling. For each stratum, random sampling was used to select these 20 schools. In the second stage, 20 classrooms within schools were purposively selected where learners are taught in either Afrikaans or English. One class of Grade 11 learners were purposively selected per school. During stage three, a sample of convenience was used to select 840 learners representing the selected classes (± 42 learners in each class) to participate in the study.

The researchers included a big sample to account for possible dissimilarities in the target population and avoid the likelihood of a sample error. The study sample included 650 Grade 11 learners that represented 20 schools of the 65 schools in the Fezile Dabi education district. One statistic important to all research studies refers to the response rate (i.e., the number of individuals who responded to the questionnaire) divided by the total number of respondents to whom the questionnaire was administered. The response rate of the learners reported 77.4 % (650/840 x 100).

This study employed a closed-ended questionnaire as the data collection instrument. Section A consisted of 19 questions relevant to the demographic variables of the sample. Examples of items contained in this section refer to gender, race group, age, home language, and language of learning and teaching (LOLT), among others. Data was collected using nominal scales and reported in frequency tables and graphs. Section B consisted of 4 sub-sections, each containing a set of questions, preventing cognitive overload. In total, 75 questions were included. The response to each of these questions was sought on a four-point Likert-type scale ranging from Strongly Disagree (1), Disagree (2), Agree (3), to Strongly Agree (4) and contained items pertaining to the four dependent variables of the study.

The Likert-type scale is a popularly used multiple-item scale survey questionnaire that employs summated ratings to determine the strength of the attitude measured and attempts to quantify constructs, which are not directly measurable. The Likert-type scale items allowed for ease of access, reading, and responding. The data collection instrument was developed by the researchers through consultation with literature and experts in the field.

In this vein, the goal of measurement is to capture dependent variables with precision, sufficient variability, and sensitivity to proposed relationships and/or differences (Lee, Pickard, 2013). The validity and reliability of the measurement instruments influence the probability of obtaining statistical significance in the data analysis and the extent to which meaningful conclusions are drawn from the data (Tirivangana, 2013). Reports of validity and reliability estimates were necessary to determine the adequacy of the psychometric properties of the Likert-type questionnaire. Prior to analysis, the researcher conducted tests of the validity and reliability of the research instrument.

The face and content validity of the questions were tested by subjecting the questionnaire items to a panel of three judges and experts in the field to verify the validity. A pilot study was conducted prior to the research to further test validity and reliability. Furthermore, factor analysis was computed to obtain evidence of construct validity. Firstly, exploratory factor analysis (EFA) took a broad look at test data to determine how many underlying components were possible.

Secondly, confirmatory factor analysis (CFA) is a method used to test theoretical predictions about underlying variables or factors that make up a construct, and the process of CFA involved proposing underlying factors and then verifying their existence using statistical procedure of factor analysis. Criterion-related validity was not tested in this study. The Cronbach's alpha test which measures the internal consistency reliability of the research instrument for this study, was used as the reliability coefficient for the Likert-type scale in section B of the questionnaire. A Cronbach Alpha on each of the four dependent variables/constructs was calculated. The researchers also tested for inter-rater reliability by reporting the ICC statistic.

Research questions and hypotheses

The main research questions that guided the study refer to the opinions of learners, whether any relationship exists between conscious awareness, cognitive engagement, metacognitive engagement, and information processing ability and what role conscious awareness, cognitive engagement, and metacognitive engagement play in the IPA of learners in the classroom?

The structural equation modelling (SEM) research null hypothesis was formulated to answer these research questions: There is no statistically significant relationship between IPA, CA, CE, and ME.

SEM is a general statistical modelling and confirmatory technique used to delineate structural relationships among theoretical constructs (DVs) in that it tests – i) models that are conceptually derived and ii) if the theory fits the data. As part of the model specification, the exogenous (IVs) variables represented CA, CE, and ME, whilst the endogenous (DV) variable was IPA. The SEM analysis tested the theoretical (hypothesised/structural) model (i.e., the SEM

null hypothesis) about the causal relationship between the DVs (IPA, CA, CE, and ME) as determined by the empirical data and measurement model.

Validity and reliability

Reports of validity and reliability estimates are necessary to determine the adequacy of the psychometric properties of the scales in a questionnaire. The information gathered for this study was done using a Likert-type scale questionnaire. Since it was attempted to quantify constructs that are not directly measurable, multiple-item scales and summated ratings were utilised to quantify the construct(s) of interest.

Exploratory factor analysis is employed when constructs are not directly measurable and simultaneously ensures the construct validity of the questionnaire. The constructs measured for this study (IPA, CA, CE, and ME) were extracted by employing exploratory factor analysis.

Exploratory Factor Analysis (EFA) for learners

As the first step, EFA was conducted on the data pertaining to learners. The sample size was deemed to be adequate (n=650) by referring to the Kaiser-Meier-Olkin (KMO) measure of sampling adequacy.

Table 1. KMO and Bartlett's test for learners

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	**0.966**
Bartlett's Test of Sphericity	
Approx. Chi-Square	26917.058
df	2775
Sig.	0.000

As deduced from Table 1, the correlation between variables is considered significant at $p < 0.05$ (0.001). Furthermore, the KMO measure of sampling adequacy of 0.966 indicates a sufficient sample size (KMO > 0.9 --> superb). Figure 3 displays the scree plot, indicating that four distinct factors loaded above an Eigenvalue of 1 were retained as part of the analysis and hypotheses testing. This implies that the four factors extracted by employing the Principal Component and the Direct Oblimin rotation method explained a total variance of 45.5% in the constructs or dependent variables.

The pattern matrix indicated the regression weight loading for each question (75 questions in total). The questions that loaded above a regression weight of 0.3 were retained. Out of the total of 75 questions, 9 questions loaded below 0.3 and were discarded. The EFA indicated that 12 questions loaded significantly for the dependent variable CE, 14 questions in total loaded significantly on CA, 25 questions loaded significantly on ME, and 15 questions loaded significantly on IPA.

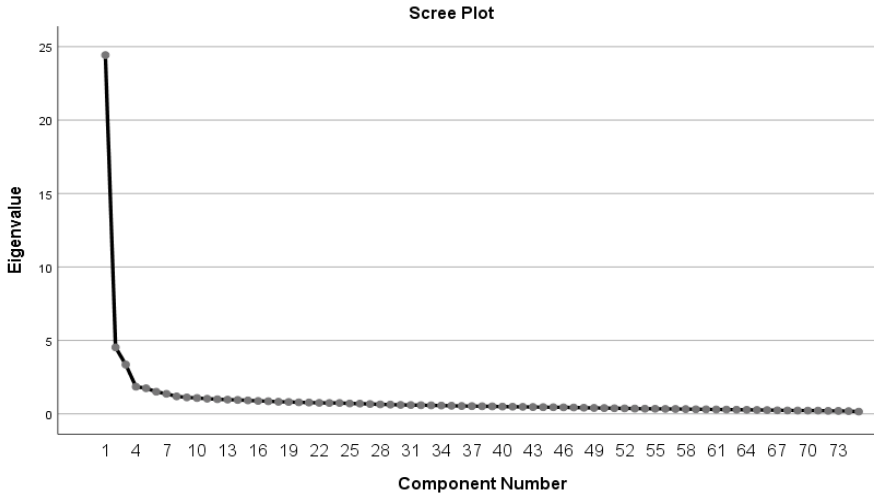

Fig. 3. Scree plot of Eigenvalues for learners

Reliability

Cronbach's alpha, which measures the internal consistency reliability of the research instrument for this study, was used as the reliability coefficient for the Likert-type scales. A Cronbach alpha coefficient was calculated on each construct to confirm their reliability in the local context. A Cronbach's alpha reliability coefficient usually ranges between 0 and 1. The closer Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the items in the scale. George and Mallery (2003) provide the following rule of thumb: _ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable.

As shown in Table 2, the Cronbach alpha for the DVs reported all above 0.8 and 0.9, indicating a good to excellent internal consistency.

Table 2. Cronbach alpha and ICC reliability coefficients for the dependent variables

Dependent variables	**Cronbach alpha coefficient**	**Number of items tested**
Cognitive Engagement (CE)	0.820	11
Conscious Awareness (CA)	0.897	14
Metacognitive engagement (ME)	0.940	25
Information Processing Ability (IPA)	0.939	15

Assumptions for statistical analysis

Garson (2012) asserts that all statistical procedures have underlying assumptions. An expected component of quantitative studies is to establish that the data of the study meet these assumptions of the procedure. Similarly, O'Neil (2009) outlines the importance of meeting the conditions of a particular statistical procedure before data analysis is done.

Normality

According to O'Neil (2009), it is assumed that the data gathered for statistical analysis is from a normally distributed population. As inferential statistics is done to verify that some or all of the results are applicable to the entire population, it is paramount that the population's distribution should also be normal. One instance which guarantees normality is when the distribution of the individual observations from the sample is normal. However, even if the distribution of the individual observations is not normal, the distribution of the *sample means* will be normal if the sample size is around 30 or larger. This is due to the 'central limit theorem' which posits that even when a population is non-normally distributed, the distribution of the *sample means* will be normal when the sample size is 30 or more. Since the sample size of this study was larger than 30 (N=650), the principle of normality of distribution was adapted.

Homoscedasticity

In statistics, the Levene's test is an inferential statistic used to assess the equality of variances for a variable calculated for two or more groups. Some common statistical procedures assume that variances of the populations from which different samples are drawn are equal. Levene's test assesses this assumption. It tests the null hypothesis that the population variances are equal (called homogeneity of variance or homoscedasticity). If the resulting p-value of Levene's test is less than some significance level (typically 0.05), the obtained differences in sample variances are unlikely to have occurred based on random sampling from a population with equal variances. Thus, the null hypothesis of equal variances is rejected, and it is concluded that there is a difference between the variances in the population. Homogeneity of variances (homoscedasticity) thus assumes that the dependent variables exhibit equal levels of variance across the range of predictor variables. Conversely, heteroscedasticity refers to a scenario where the variability of a variable is unequal across the range of values of a second variable that predicts it (Taylor, 2013). Table 3 indicates the descriptive statistics and tests conducted for homoscedasticity.

A Levene's test was conducted for each dependent variable. All the dependent variables were found to be *not statistically significant* (equal variances are assumed), since the p-value was in each case > (greater than) 0.05. Based on the above homogeneity of variances for each of the variables, the researchers accepted this statistical assumption met.

Table 3. Levene's test of homogeneity of variances for the dependent variables

Dependent variables	Levene Statistic	*df 1*	*df 2*	Sig.
For Learner data: Cognitive Engagement (CE)	.639	4	639	.635
Conscious Awareness (CA)	2.239	4	639	.063
Metacognitive engagement (ME	.606	4	639	.659
Information Processing Ability (IPA)	1.829	4	639	.122

Ethical clearance for the study was provided by the Faculty Research and Innovation Committee of the Faculty of Humanities.

3. Results

Structural Equation Modelling (SEM)

A SEM analysis was done on the data from learners to test the SEM null-hypothesis. Figure 4 and Table 4 display the results.

SEM Hypothesis There is no statistically significant relationship between **IPA, CA, CE,** and **ME**.

From Figure 4 and Table 4, all the regression weight estimates (i.e., path coefficients) are indicative of the amount (strength) of variance accounted for by each exogenous variable (i.e., IVs) on the endogenous variable (i.e., DV), meaning how strongly each exogenous variable influences the endogenous variable. The strength of these regression coefficients is reported as weak (.30), moderate (.50) and strong (.70) relative to the obtained ß weights. The statistical significance of these relationships between variables are also reported. As is evident from Table 4, these relationships between the four variables were found to all be statistically significant at $p < 0.05$ (0.001), where CA, CE, and ME were significant predictors of IPA:

CE <--- CA Standardised indirect coefficient =.533, p<0.05(0.001) was statistically significant.

ME<--- CA Standardised indirect coefficient = .586, p<0.05(0.001) was statistically significant.

IPA<--- CA Standardised direct coefficient = .310, p<0.05(0.001) was statistically significant.

IPA<--- ME Standardised indirect coefficient = .410, p<0.05(0.001) was statistically significant.

IPA<--- CE Standardised indirect coefficient = .150, p<0.05(0.001) was statistically significant.

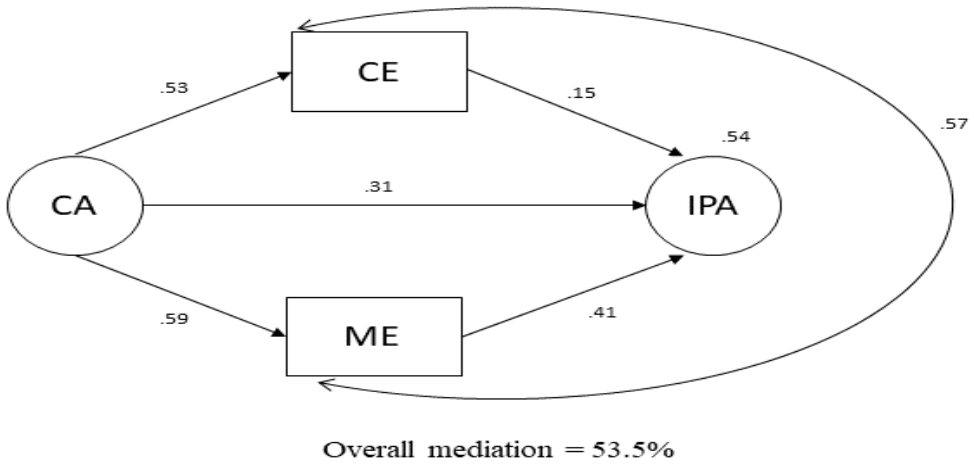

Fig. 4. SEM analysis on data from learners

Figure 4 claims that CA is a significant predictor ($p < 0.001$) of IPA (direct effect with a weak positive correlation of .31). CA is also positively correlated with ME (moderate to strong correlation of .59) and CE (moderate correlation of .53). There is a significant and strong combined mediation (indirect) effect evident for ME and CE on the direct effect of CA on IPA measured at 53.5 %. This implies that ME and CE (as mediator variables) also significantly affect IPA.

Baron and Kenny (1986) explain that a mediation model seeks to explain the relationship between an independent variable and a dependent variable via the inclusion of a third variable, known as a mediator variable. Rather than a direct causal relationship between the independent variable and the dependent variable, a mediation model proposes that the independent variable influences the mediator variable, which in turn influences the dependent variable. Thus, the mediator variable serves to clarify the nature of the relationship between the independent and dependent variables. However, the mediation effect of ME (.59 and .41) is stronger than the mediation effect of CE (.53 and .15) on IPA, as depicted in Figure 4.

Table 4. SEM analysis of data from learners (N = 650)

Variables	**Regression weight estimates**	**S.E.**	**Sig value p**	**Standardised Regression weight estimates**
CE <--- CA	.572	.064	0.001	.533
ME <--- CA	.723	.077	0.001	.586
IPA <--- CA	.400	.062	0.001	.310
IPA <--- ME	.429	.047	0.001	.410
IPA <--- CE	.181	.049	0.001	.150
CE <---> ME	.572	Correlation		
Overall mediation = .535				

Therefore, the SEM null hypothesis for learners is rejected as all these relationships are statistically significant.

4. Discussion

The main findings of the study illustrated that there is a statistically significant relationship between the IPA of learners and conscious awareness, cognitive engagement, and metacognitive engagement. The main research questions that guided the study refer to learners' opinions about whether any relationship exists between conscious awareness, cognitive engagement, metacognitive engagement, and IPA and what role conscious awareness, cognitive engagement, and metacognitive engagement play in the IPA of learners in the classroom.

As evidenced in Figure 4, the IPA of learners is directly and positively influenced by their conscious awareness (CA) in the classroom and was found to be statistically significant as calculated by the SEM analysis. The SEM analysis also illustrated that the relationship between CA and IPA is strongly mediated by CE and ME as predictor variables, where CA also strongly influences CE and ME, and CE and ME influence IPA. As deduced from the SEM analysis, there is a significant statistical relationship between these four DVs according to the learners. This implies that learners are of the opinion that their IPA is directly influenced and dependent on their conscious awareness, i.e., attention in the classroom. Learners are furthermore of the opinion that the relationship between their conscious awareness and IPA is mediated by their cognitive and metacognitive engagement in the classroom.

Bandura's social learning theory maintains that thought is influenced by internal processes involving attention, memory, and motivation, which might not be as readily observable as behaviour and its consequences (David, 2019). Latief and Dar (2014) explain that learning depends, in part, on the effective use of basic cognitive processes such as memory and attention, the activation of relevant background knowledge, and the deployment of cognitive strategies to achieve particular learning goals. Learning begins with attention; classroom attention could be cultured through active learning. The principles ensconced in MBE Science further confirm that

attention is necessary during the learning process (Tokuhama-Espinosa, 2018). Through the findings of the SEM analysis conducted during this study, it was also found that attention, i.e., conscious awareness (CA), was necessary for learning, i.e., information processing (IPA).

However, principles of active learning remain a challenge for teachers in classrooms, and this study also attempted to outline these challenges by conducting an HLM analysis in which the influence of learner demographic variables (IVs) are explained to provide thoughtful insights for the creation of TLIE in South African schools. Against this backdrop, the results of learners and teachers in this study concur with assertions by David (2019) and Latief and Dar (2014). Solis (2008) agrees that teachers need to teach for engagement, and from education literature, it becomes evident that learner engagement is a prerequisite of learning, and for learning to be truly meaningful, learners have to be cognitively and metacognitively engaged through facilitated attention. The results further indicated that focused attention (i.e., conscious awareness) is indeed a vital cognitive behaviour necessary for learning. Ultimately, this study also intended to articulate the challenges facing education with regard to delivering educational professionals who are capable of inducing meaningful information processing by the learners during teaching.

5. Recommendations

The authors argue that the appropriate role of teachers is not to train learners in routine skills but to inspire and excite learners to new heights of creativity and imagination. The latter cannot be achieved through the sole humdrum of lesson presentation standing at the front of the classroom. Based on the stance mentioned above, the authors surmise that the most critical strategy, performances, and manoeuvres of a good and successful teacher regarding the ability to change and modify learners' behaviours to learn is embedded in the power of the teacher to regulate and order learners how to think, act, and behave (i.e., how to process information).

The teacher's ability to enable learners to receive, perceive, and manipulate the incoming information by either assimilation or accommodation in the cognitive schemata for deeper and broader knowledge that is meaningful and understandable is through the teacher's knowledgeability of the simultaneous impact of juxtaposed theories of learning to stimulate and cultivate learners' IPA. Teachers should take special interest in studying the brain (i.e., from an educational-neuroscientific stance), because they should understand how the brain contributes to educational phenomena, such as learning, critical thinking, problem-solving, information processing and memory. Teachers are indeed not neuroscientists, but they are members of the only profession in which their vocation is to change and transform the human brain daily.

In the process of teaching, it is imperative for teachers to encourage learners to ask questions, to analyse, to criticise, to compare and contrast, to wonder, and to become aware of alternatives. Certainly, learners' perceptions about themselves, their attitudes towards academic work, and their motivations influence their academic performance. Teachers should, therefore, also help learners analyse their own behaviour of processing information and evaluate their beliefs regarding their lifelong requirement to be consumers and manufacturers of knowledge bases that would mould their meaningful understanding of the elements or aspects of what constitutes life, living, and being assets through their mind/thinking.

Teachers should intentionally create a conducive and interactive teaching-learning environment in which learners can discover that their serious effort toward learning makes it possible for them to attain a sense of academic competence, which unconsciously modify the quality of their cognitive growth and development immeasurably. It is in this context that the research surmises that learners will immensely perceive the significance of the curriculum content incalculably.

Teachers should be subjected to periodic evaluation and accountability by departmental heads and or senior teachers for the depth and breadth of their learners' IPA, deducing from low achievement scores in assessments. Remediation by way of allowing a mentor assigned or chosen by the teacher can then be justified to train or advice on how to rouse and maintain IPA by the learners.

6. Limitations

This study was conducted in the field of educational psychology. It was confined in the Further Education and Training Phase (FET Grade 10-12) in the Fezile Dabi education district. The results of the study cannot, therefore, be extrapolated to both teachers and learners of Basic Education and those in tertiary institutions.

7. Declarations

Ethics approval and consent to participate

Ethics approval was granted by the Central University of Technology, South Africa, with informed consent from all participants.

Consent for publication

Not applicable.

Availability of data and materials

Please contact the author for data and materials associated with this study.

Conflict of interest statement

The authors of the manuscript declare that there is no conflict of interest, and all reference materials were duly acknowledged.

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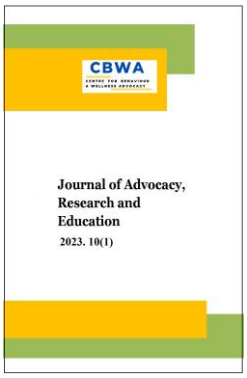

Decolonising Life Skills using Indigenous Games in the Foundation Phase: Exploring Rural Learning Theory and Ubuntu Philosophy

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Abstract

This paper foregrounds values-based education, as linked to the inclusion of sustainable rural learning and knowledge in the form of indigenous games to decolonise school curricula. Certain curriculum challenges are unique to rural ecology and can only be addressed by experts and philosophers passionate about sustainable rural learning using ubuntu perspectives. This approach of using rural learning methodologies to teach school children is fertile ground for innovation in this study. Interpretivism, in the form of a phenomenological case study approach, was employed, using semi-structured interviews and classroom observation. Document analysis was also used to corroborate the findings. The findings reveal that indigenous games are implied in the curriculum, and teachers do their best to infuse local games in the Grade R, 1, and 2 Life Skills curricula. It was found that many indigenous games are a perfect strategy for infusing sustainable rural learning methods useful for teaching Life Skills in a decolonised approach. Teachers showed pedagogical content knowledge and skills for teaching Life Skills using indigenous games and Ubuntu philosophy. The results call for supportive in-service teacher programmes that can equip Foundation Phase teachers to improve their teaching strategies. In addition, resources should be earmarked to promote pedagogical content knowledge aligned with rural learning.

Keywords: indigenous knowledge, ubuntu philosophy, African child, indigenous games, rural education.

1. Introduction

This study engages with the argument that South Africans used to have strong faith in the spirit of Ubuntu linked to traditional systems to fix complex problems. The study conducted by Mabaso (2017) reiterates that the ideals enshrined in ubuntu philosophy are meant to transform the education system into a truly South African one, seeking to inspire African heritage, values, and knowledge in the education system to ignite rural learning approaches. Scholars predict that Ubuntu philosophy will soon run out of steam, and its applicability to the education system is being called into question; however, Ubuntu is here to stay (Alexander, Plyyamoli, 2014; Ngasike, 2019). There is no denying the firm traditional belief that ubuntu values are a unifying tapestry for a diverse country like South Africa (Padayachee et al., 2018).

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Statistics reveal that most rural children leave primary school with scant and incoherent knowledge about their history, heritage, pan-Africanism, integrity, morality, and ethnic values of Unhu (humanness) or Ubuntu (Biriescu, Babaita, 2014; Myende, 2018). The CAPS curriculum pronounces on ten values, including ubuntu philosophy, linked to African indigenous knowledge systems (AIKS). AIKS include oral traditions such as proverbs, maxims, poems and songs, indigenous games, and sociocultural structures (Mabaso, 2017). However, studies have shown that AIKS is portrayed as the 'other', and this perception perpetuates race and class divisions in society.

This study aimed to present an argument for the significance of the use of indigenous games and mother-tongue instruction in sustainable rural education as part of the decolonisation strategy in South Africa. I argue that rural schools can be used as centres of excellence, focusing on the Ubuntu philosophy. I begin by presenting background information on the history and culture of these schools, as well as their socioeconomic and educational marginalisation.

The philosophical underpinnings of Ubuntu

The philosophical meaning of Ubuntu is understood as *motho ka batho,* which means "a human being is a human being because of other human beings". This explanation resonates with the translation found in other African languages. Nussbaum (2003) sees Ubuntu as a social philosophy, a way of being, a code of ethics, and behaviour deeply embedded in African culture. The ideals of the concept should be stressed to learners, giving them an arsenal for the future. Interestingly, both Mabaso (2017) and Mbigi (1997) see this concept as both uniquely African and universal, as it is implicitly expressed elsewhere in the world. Ubuntu philosophy posits that common bonds or underpinnings exist between all human beings and other forms of creation (Alexander, Plyyamoli, 2014). In the school context, Ubuntu encapsulates humanness, fighting for each other, fairness, and playing games to stimulate competition, justice, and an African values system as the underlying fortress of African societies for millennia *(*Qobo, Nyathi, 2016).

2. The theoretical lens

Rural learning ecologies

The famous paper titled "Creating Sustainable Rural Learning Ecologies in South Africa" by Hlalele (2014) argues that education in rural ecologies has a responsibility to make its voice heard and contribute to the generation of knowledge and make it accessible to communities (Ngasike, 2019). The concept of sustainable rural learning was first developed by the Nelson Mandela Foundation (NMF) to bring the attention of the Department of Basic Education (DBE) to the plight of rural communities (Ngasike, 2019). This study was critical of the curriculum identity and the quality of education in South African schools, with rural schools continuing to receive inferior education while their urban counterparts received a quality education.

Pedagogy and South African communities

Traditionally, values-based pedagogies in South African communities were conveyed in the form of proverbs, poetry, songs, riddles, and folklore (Masote, 2016). This was done to shape young children for responsible citizenship. In traditional African society, music plays a major role from birth to death (Manganye, 2011). Several non-Tsonga music teachers taught indigenous Tsonga children's games and songs at their primary schools (Manganye, 2011). Indigenous pedagogy is a tool for conveying these songs to learners as to how to dance with music rhythm. These songs talk about respecting elders and taking care of the body, especially for young girls. Indigenous pedagogy in traditional African culture manifests in young children's physical, mental, social, and emotional development. Ogunyemi (2014) argues that traditional African pedagogy took on a variety of forms:

- Physical – running errands in the neighbourhood, wrestling, music, and dancing
- Social – movement in groups, copying the parents' roles
- Free play – working with objects and materials within their environment to create images for their use
- Games with rules – taking turns and following the agreed procedure
- Adult-moderated play – moonlight storytelling, narrating family history, community festivals, and dances

Ubuntu philosophy as a foundation for sustainable rural learning

Culture manifests through the spirit of Ubuntu. Shepherd and Mhlanga (2014) see it as an African philosophy centred on the concept of Unhu or Ubuntu. Schoeman (2006) concurs that

Ubuntu is a traditional African moral concept used pre-scientifically as a tool for transformation, affirmation, and pride. The International Association of Universities on the Ubuntu Declaration acknowledges that the goal of education in all its forms is to impart knowledge, skills, and values that empower people to bring about change (Webbstock, 2016).

A study by Maddock and Maroun (2018) reveals that schools in rural and semi-rural areas usually attract indigenous teachers and learners, which calls for education tailor-made for this setting. Similarly, Shepherd and Mhlanga (2014), in their study on the nature of philosophy for children, refer to indigenous pedagogy and how its qualities can help resuscitate the worldview of Ubuntu imbued in indigenous philosophy. Such education is characterised by indigenous education practices, including customs, norms, and traditions, as well as pedagogies in the form of songs, poems, stories, and games that are rooted in local languages. The geographical nature of South Africa and the spatial distribution of its citizens produce many ethnic groups that may differ from one locality to another, even among the same language speakers (Nxumalo, Mncube, 2019). As the custodians of education, policymakers have a huge responsibility to infuse indigenous education into the current system to address the inclusivity and heritage of the local people (Nxumalo, Mncube, 2019). Hence, stakeholders liken this education to indigenous teaching, requiring learning aids that are relevant and effective in promoting the best heritage of the people. This is particularly relevant in the quest to realise sustainable rural learning and knowledge while advocating quality education in South Africa. This resonates with the observation made by Maddock and Maroun (2018) that Ubuntu is a way of 'being' and characterised as the lived experiences that must be exemplified by all teachers in the learners' lives.

A paper presented by Ogunyemi (2014) at the UNICEF conference in 2016 underscores the role of sustainable rural education by highlighting the notion that every child belongs to the community. The community must deliberately channel this child through ubuntu philosophy to realise his or her full potential. In this important role of nurturing the child, everyone in the village contributes to the child's upbringing: *"It takes a village to raise a child"* (Seroto, 2011). Ogunyeni's (2014) paper aims to caution all key stakeholders about the significance of a learner's life in the process of curriculum enrichment (parents, school management, teachers, and indigenous knowledge holders). In addressing curriculum responsiveness, Ogunyemi (2014) describes the co-creation of an educational curriculum for early childhood education through a partnership with community members using a living curriculum framework called the Generative Curriculum Model.

Envisaged decolonised curriculum: Using games to decolonise the curriculum

Le Grange's (2016) views testify to the fact that schools should embrace a curriculum founded on the philosophy of Ubuntu. He calls this moving away from the Descartes *cogito, ergo sum,* "I think therefore I am" to "I am because we are." Although many scholars appreciate the decolonisation discourse, others merely pay lip service to remain relevant as researchers and teachers (Webbstock, 2016). In shaping the ontological project that reasserts curriculum orientation processed in African philosophy. Ndofirepi (2017) argues that these tendencies can solve the complex paradox and confusion about the decolonising curriculum.

With their long history of colonial practices, research in countries like Canada and New Zealand acknowledges the need to decolonise curricula by embracing inclusive curricula linked to indigenous epistemologies. Cupples and Glynn (2014) caution policymakers and government that such a transformative agenda continues to pose risks to curriculum transformation. It has become clear from the literature that the notion of decolonisation needs more commitment than merely inserting new content and indigenous games (Nxumalo, Mncube, 2019). The CAPS curriculum is written by South Africans who understand the value of indigenous games, as one of the principles speaks of "valuing indigenous knowledge" (BDE, 2017). This principle represents heightened awareness of the need for curriculum change aligned with decolonisation. The articulation of such aspirations without a clear research agenda is meant to disrupt the old existing order by encouraging sympathetic and ethical practices that remain a myth (Smith, 2012).

In his article, Jansen (2017) proposes that African scholars should build capacity among teachers to work towards healing, reconciliation, and development, seeking to influence curricula directly by adopting user-friendly activities such as games and idioms. Therefore, this research is about decolonising the curriculum by offering alternative forms of activities such as games (Chilisa, 2012). Such games emphasise indigenous knowledge systems and clearly demonstrate the ubuntu philosophy

needed in society. Webbstock (2016) calls for integrating indigenous knowledge into the curriculum using methods familiar to teachers to contribute to the decolonisation of the curriculum.

3. Methodology

A phenomenological case study approach was leveraged to better understand Foundation Phase teachers' experiences using indigenous games to teach Life Skills. The choice of this approach was motivated by the research problem and the characteristics of qualitative research that apply to this research. In order to better understand the participants' lived experiences of the concept or phenomenon, the study was located within a case study design (Yin, 2014). A case study focuses on one phenomenon selected by the researcher to understand holistically; in this case, indigenous games to teach Life Skills (McMillan, 2006). Semi-structured interviews, observation, and document analysis, were used to generate data that were later processed and analysed using data coding and then categorising such codes to generate themes that later became the findings of this study. The research comprised a qualitative case study, which lends itself to social and constructive methods. In essence, knowledge is socially constructed as the researcher and the researcher (teachers and learners) interact naturally. Teachers were interviewed to solicit their experiences in their respective schools, while learners were observed while engaged in indigenous games during Life Skills periods.

Population and sampling

According to McMillan and Schumacher (2010), a population is defined as a group of elements or cases, whether individuals, objects, or events, that conform to specific criteria meant to generalise the outcome of an investigation. Foundation Phase teachers from uMzinyathi District in the Nqutu circuit were ideal participants, considering their knowledge of selected indigenous games used in schools. The sampling strategy identified five primary schools in one cluster as forming the case for the research. Sampling is the process of selecting units from a population of interest so that by studying them, the results may be generalised back to the population from which they were chosen. Purposive sampling was used; this involves the deliberate selection of a small number of information-rich cases from a larger population for in-depth study (Cresswell, 2005; Sarfo et al., 2022). From a population of 65 teachers in the cluster, five highly experienced Foundation Phase teachers (with more than ten years of teaching experience) and one subject advisor were selected.

Instruments and procedures

Data were collected on school premises. Letters detailing the purpose of the study were presented to the participants, who later gave their consent. Targeted observations were conducted in Grades R, 1, and 2. Semi-structured, face-to-face individual interviews were held with the teachers and the subject advisor to gather information about using indigenous games during the teaching of Life Skills in the Foundation Phase. These interviews lasted approximately 30 minutes and were held during the teachers' free periods or after working hours until saturation (Sarfo et al., 2021). A digital recording device was used to record the interviews, and the transcripts were later coded for analysis.

Ethical considerations

Ethical issues and legal obligations were observed in this study to avoid unintended consequences. This involved disclosing the nature of the study to participants, informed consent, and avoiding exposing participants to risk. The researcher is obligated to protect the privacy of participants; as such, attention was paid to anonymity, confidentiality, and the storage of data (McMillan, 2006). All six participants were given pseudonyms to conceal their identities: Piet, Sabatha, Miriam, Olga, Yvonne, and the subject advisor, Thandwayo.

4. Results and Discussion

This study investigated strategies used by five veteran Foundation Phase teachers and one subject advisor for using indigenous games to decolonise the Life Skills curriculum. Three methods of data generation were applied to navigate the complex process of data analysis. This study aligned the data analysis process with methods recommended by Ramrathan (2016), using triangulated data for quality results. A theoretical framework was used to align the results with the thematic approach, and the results were later conceptualised against the appropriate literature. The rigorous process of data analysis produced three main themes and three subthemes linked to the indigenous

games these schools use to teach Life Skills in the Foundation Phase. The learners play more than twenty indigenous games at the schools and the participants reflected on selected games to explore their significance in the teaching of Life Skills in the Foundation Phase. These games include ushumpu, umasgenda, inqabethu, umlabalaba, umngcwabo, arigogo, izimpisi, isango legolide, ingwenya, ikati negundane, phuma la, to mention just a few.

The relevance of indigenous Zulu games in the Foundation Phase

The first theme to emerge from the data was the relevance of indigenous games in teaching Life Skills. These games are played by most learners in the community, and it was evident that most participants were familiar with these games and that learners play these games in class and during break time, as well as beyond, owing to their popularity. These were the sentiments shared by Sabatha and Piet about the relevance of indigenous games.

Sabatha: "*This is my community, I know the culture very well, and in my upbringing, I played some of these games the same way these young kids play today … the whole excitement and the nostalgia bring back those good memories, and some of us used to be good at playing … and later we became responsible individuals through values inherited from playing these games.*"

Piet: "*… now I am a big fan advocating for the integration of indigenous games into the curriculum, and they are more relevant than any of those famous ones … our learners are weak and lazy because they are not playing these indigenous games … and a lot of useful information is learnt and even the discipline as well.*"

Most of the games have their genesis in the local community, while others are generic in the Zulu people's cultural orientation and heritage. Most of these games are named according to how they are played and what they seek to achieve. Participants were very excited to be reflecting on something they knew inside out, and all this invoked nostalgia. In terms of relevance, participants were convinced that these games add value when used for teaching purposes. Yvonne was not sure how the DBE wanted them to infuse these within the curriculum, but she endorsed the inclusion of indigenous games:

Yvonne: "*… my knowledge of these games is as fresh as yesterday, and learners even play outside during break time. Some of the learners are very fond of these games. Some even bring readymade material and natural material from home to use after the break when playing … others like 'ushumpu' which is a ball made from rags and plastics, young learners throw this ball in the air and run to collect points; when one is touched its game over … this is an incredible game to watch now as is then … it teaches them to count and be engaged in physical education when running for cover.*"

Olga: "*… if I remember very well, most of these games are played to build a strong character and resilience in young learners … knowing that you have to be tough and mentally strong to compete only leaves you with a feeling of winning mentality.*"

The participants stressed the need to use a variety of props such as old cloth, balls, shaped objects, and plastic in indigenous games. There was consensus that the games cover the creative arts and physical education. They require natural objects and artefacts readily available in the learners' environment. In the case of *umasgenda*, learners need open space to place 12 to 16 small stones. Some of these materials are easier to obtain than others. Learners can use these resources during free play activities and structured activities, when they have finished a teacher-directed task, or simply when they need 'time out'. The Foundation Phase curriculum highly supports various games played inside and outside the classroom. One of the highly enthusiastic participants was bubbling during the interview and used a very powerful principle of the CAPS to justify the need for indigenous games and decolonisation of the Life Skills curriculum.

Mariam: "*… one of the principles that pride our nation underpinned in this curriculum advocates for valuing indigenous knowledge systems, in this scenario I specifically refer to going back to our roots, which simply means 'azibuyele emasisweni'… our heritage and rich history need to be harnessed by our kids, and us must know these things and lastly document these important treasures for the future generation.*"

Yvonne: "*… in my personal view, our education system should support local innovation and encourage those teachers who use indigenous knowledge to aid their teaching by supporting, appreciating, and funding their innovation.*"

The other justification supported by this study was in favour of infusing indigenous games into the Foundation Phase curriculum to promote the values of Ubuntu enshrined in the

Constitution. The values of Ubuntu, compassion, togetherness, love for one another and solidarity are the basis for indigenous games (Nxumalo, Mncube, 2019). All participants were aware that the Constitution, as the supreme law of the land, recognises and cherishes the importance of protecting values linked to Ubuntu.

Sabatha: "*… my little understanding of the Constitution reminds me of the need to protect what belongs to our heritage, values like compassion, respect, fair competition, and other important ones that we have been practising for centuries.*"

Yvonne*: "… it's nice to talk because talking is cheap, but we need to pride ourselves on this rich heritage and values of Ubuntu engraved in our upbringing … founders of our Constitution and the Bill of Rights thought hard about these values were critical to being protected and cherished as they are clearly stated in the supreme book like Constitution … values linked to Ubuntu… they are a man.*"

The fact that our education addresses the values engraved in our Constitution was a very powerful statement from the participants. The disparities inherent in our society were calculated and orchestrated through a series of measures targeting the black majority, and now the power of the Constitution can work wonders by infusing education with much-loved indigenous games and play linked to our heritage. The next section focuses on how these indigenous games are used to decolonise Life Skills.

Using indigenous games to decolonise Life Skills in the Foundation Phase

The second theme focused on the feasibility of decolonising Life Skills using indigenous games and promoting Ubuntu in the Foundation Phase in rural schools. Decolonisation is one of the popular terms used by slogans used by student formations across the country to advocate for change toward indigenous knowledge. Below, the participants describe this concept to clarify the need for a fresh and innovative approach to education. None of the participants claimed with certainty to understand the rationale for decolonisation in the grand scheme of things or indigenous games in the Foundation Phase context. Establishing a common understanding and ideas underpinning curriculum and decolonisation is crucial. Pinar (2012), an American theorist, explains a curriculum as the interdisciplinary study of the educational experience. It encompasses attitudes, values, dispositions, and worldviews learnt, un-learnt, re-learned, re-formed, deconstructed, and reconstructed while studying at school (Pinar, 2012; Ndlovu-Gatsheni, 2019).

Common responses from participants were that students from elite universities were calling for 'Rhodes Must Fall' and 'Fees Must Fall', which was confusing for rural teachers. To them, this meant gravitating towards an African philosophy of education and ubuntu values or philosophy in the education system. Their major concern was that this was a legitimate concern, but very little progress to date seems to have been made to the philosophy and sources of information. One of the pertinent questions to be answered is, do teachers in the Foundation Phase infuse indigenous knowledge, such as games, in the curriculum when teaching? It was interesting to note that none of the participants was willing to claim to be championing this new approach. They argued that it seemed that the government was cautious and not ready to commit fully to sweeping changes embracing decolonisation. They cited many reasons for this.

Sabatha: "*… let me be the first to state that I understood the youth of 2016 when demanded radical changes to overhaul the entire education system … but many multifaceted and complicated problems exist, such as funding, African scholarship, capacity, and quality. These are important issues with varying degrees of priority, for me, our government is caught up in the mix, the system is not capable and very weak at the moment and is not capacitated enough with the brave leaders from top to bottom … that's my opinion.*"

Olga: "*… we don't have our written books, readers, website, online stores selling books written by African philosophers and scholars advocative ubuntu values and other sources written to reflect indigenous knowledge(s) and ubuntu philosophy to implement the so-called decolonisation in our schools … it's a very simple process, but our archives are full of western material, fabricated stories… what can we do, we have no legitimacy at all and the influence to our values as taught through indigenous games.*"

Participants noted that the DBE needs to introduce well-theorised scholarship and a well-coordinated African-aligned epistemology underpinned by African local experience where indigenous games could be used as an experiment. The participants believed their expertise and wealth of knowledge in the Foundation Phase is their biggest asset in transforming the education

landscape. The rural context has its opportunities and challenges in implementing indigenous games. Teachers are 'transformative intellectuals', implying that their pedagogical competence elevated them to the top of the food chain when it comes to knowledge construction. We are aware that changes are happening faster than we predicted, and the new teaching philosophy is inevitable and will change the landscape of education. Using indigenous games during free play outside and inside remains their main priority, and participants are taking advantage of their environment, local culture, and rich heritage. Young learners are always keen to learn new games through trial and error, and the resolve is to empower them at this very early age. The perception of participants (Piet and Olga) in this section as 'revolutionising' ubuntu philosophy through indigenous games signifies a shift towards building awareness of the importance of indigenous games in a changing 21st-century pedagogy.

Piet: "*… as a school, me and my team of Foundation Phase teachers are using indigenous games like ushumpu, ikati negundane, and inqhabethu just to name a few. These indigenous games require endurance and a lot of energy when playing.*"

Olga: "*… in the Foundation Phase we decided to use possible games linked to local culture and Ubuntu values to teach Life Skills and Physical Education in our schools.*

Teachers used these games during Life skills and Physical Education to develop physical and motor development as an integral component of the holistic development of learners. In their own words, participants believed that Life Skills linked to indigenous games make a significant contribution to learners' social, personal, and emotional development. According to the CAPS document for the Foundation Phase, play, movement, games, and sports contribute to developing positive attitudes and values. Most participants used this as the basis for championing indigenous games and ubuntu values in the Foundation Phase curriculum. Interestingly, the Foundation Phase focuses on games and some activities that form the basis of participating in sports later in life.

Teaching strategies used by Foundation Phase teachers to promote indigenous games

The third theme that was worth interrogating focused on the strategies used by the schools and teachers to integrate indigenous games into the curriculum. An in-depth interrogation of data collected during the study revealed notable teaching strategies used by Foundation Phase teachers to promote indigenous games and ubuntu values. These strategies could be formalised and adopted by all schools in rural areas to strengthen the CAPS in its resolve to use indigenous games in the Physical Education curriculum.

Yvonne: "*… my suggestion is that Foundation Phase uses cluster schools as one of the strategies where we can expose our learners to the beauty of indigenous games, games are better when learners compete. Learners learn to collaborate with others while playing games. The second strategy is to use rurality as a philosophy that will elevate this importance… by design, we teach in rural areas with endless possibilities when it comes to African values and Ubuntu values.*"

Olga: "*… in my view, team teaching is one of the powerful strategies where talented learners are used in the schools to be champions of these indigenous games, while the other strategy involves using local community members on an ad hoc basis. These should be people who like indigenous games and excel in indigenous games.*"

The participants' reflections indicate the desire to change their behaviour to champion value-based indigenous games for their schools. Using indigenous games as a teaching strategy was an individual choice informed by local culture, values, and resources. Miriam teaches Grades R and 1, and the strategies of the indigenous game were based on the curriculum for these grades. Accordingly, learners play games that they know best match their developmental needs. These grades focus on themes like creative games and skills, sports and games, and locomotor development, where indigenous games like *ukucupa*, *ingwenya*, and *umasgenda* are used for teaching learners circles and squares and swimming. Grade 2 focuses on creative games and skills, as well as sports and games involving their chosen traditional games. Most schools encourage learners to play indigenous games close to a school or on the school grounds to be properly supervised. Watching them throw a ball in the air and run for cover brings excitement and joy, knowing they are engaged in physical exercise and intellectual processes. The in-depth analysis identified three main teaching strategies suggested for indigenous games linked to Ubuntu values and African philosophy.

Using team leaders as supervisors

One of the teaching strategies that emerged from the participants was the need to have young champions lead in front when these indigenous games are played. It was clear from the participants that considering the age of the learners, these games can only be organised by young people from each grade who are passionate and have good relationships with other learners. In this regard, primary schools should adopt a community-wide approach where capable learners are appointed to assist teachers with organising and implementing indigenous games on the school premises. In many cases, learners feel more at ease being supervised by their peers than by their teachers.

Sabatha: *… in most cases, I identify one of the best learners in my class as a champion to lead my class … I discuss first the type of game I want them to teach and lead my class during and outside of the class.*

Most participants were very happy with this strategy because it allows young learners to be leaders. During this period, these leaders coordinate meetings and discuss the indigenous game and how it should be played.

Organising local competitions during the fourth week of the month

The second teaching strategy that resonated with participants was staging local competitions with neighbouring schools. Initially, some participants were not keen on talking about this teaching strategy for fear of reprisal from the school management team (SMT). It turns out that leaders and most SMT members were unanimous in their support for this strategy. Most schools in rural areas are close to others, and the common thread that links them perfectly is local culture and shared heritage. Most indigenous games are common to the entire region and exploring the introduction of competition remains the most innovative teaching strategy. Participants endorsed this idea because it encouraged the sharing of resources, working together and being able to solve problems together when they see their counterparts from other schools at the game's competition at no cost to schools or parents.

Piet: *… engaging learners in a competition is the most progressive strategy because even in our times, we used to compete with neighbouring schools and now I would resuscitate this strategy … CAPS is organised very well and as we teach one theme in a term, we organised indigenous games that address that theme … this will work in our favour".*

The use of competitions and meetings between schools promotes a spirit of sharing and solidarity among schools. In essence, schools in the area develop a strong centre where knowledge is shared, and learners begin to know the best in the area when it comes to these indigenous games. Finally, a spirit of unity and ubuntu values is created which is sacrosanct.

Using rural learning to promote indigenous games

The third teaching strategy proposed by participants relates to using rural learning to promote indigenous games. Most participants sounded the alarm about the quality of the content and processes underpinning education for rural children. The main concern for participants relates to the body of academic knowledge learnt by all even though unrelated to the life experience of rural children. This observation often drives teachers to reject curriculum knowledge that neglects rural learning. The subject advisor (Thandwayo) raised this important innovation (the use of indigenous games), underscoring the value of using rurality and the rural character of the environment to teach the values of ubuntu philosophy.

Thandwayo: "*… our rurality is the powerful symbol of hope when it comes to indigenous knowledge and games are a source of inspiration to promote values and aspirations of rural learning."*

Olga: *"… taking rural education seriously serves the interest of the rural community. This education should empower people to understand that education is rooted in their values and culture and cannot be shaken."*

Indigenous games directly source a wealth of knowledge from the community and elevate them to the higher altitude of the epistemological platform. Policymakers fail to advocate for integration as the minimum learning needs of learners who grow up in rural areas in the curriculum. In this study, participants argue that curriculum design fails to address the basic needs of the local community, pointing to systemic challenges that can only be eliminated by infusing local Ubuntu values. These participants point out that rural schools in South Africa are the worst performers in all literacy and numeracy skills. Instead of blaming rural learning for poor

performance, the curriculum should look at indigenous knowledge in the form of games, among other interventions available for free in rural communities.

5. Conclusion and Recommendation

I argue that the change envisioned by the use of rural learning requires sober professionals and administrators with a strong decolonial inclination in their DNA. In essence, the South African system of education has very few courageous teachers and administrators with the right attitude to walk this tightrope during a sensitive phase in our lifetime. It is surprising to be bombarded with information about rural education from people who benefited from mainstream apartheid and white domination. These advocates have enjoyed the white privilege, in turn, using the same platform to speak for rural education and the decolonisation of the curriculum. Local media should be used as the mainstream media because national and international conferences privilege people who benefited from colonial education and who now speak about Ubuntu and decolonisation. These institutions are obsessed with ratings, inviting students, teachers, and academics from schools and universities to be the ambassadors of rural education and decolonisation. There is a caveat here: Many privileged black academics and teachers, including administrators, were indoctrinated during apartheid but jumped on the bandwagon to be the voice of reason when it comes to advocating for rural education. The road to efficient rural education is a struggle that needs rural teachers and a new generation of teachers and administrators. The participants argued that these professionals should be representative of the country's demographics and, most importantly, should ascend to senior positions of authority in schools and the DBE.

6. Declarations

Ethics approval and consent to participate

Ethics approval was granted by the University of KwaZulu-Natal South Africa, with informed consent from all participants (Ethical Clearance Number-HSS/0207/012D)

Consent for publication

Not applicable.

Availability of data and materials

Please contact the author for data and materials associated with this study. Data and other materials will be provided if required.

Conflict of interest statement

The authors of the manuscript declare that there is no conflict of interest, and all reference materials were duly acknowledged.

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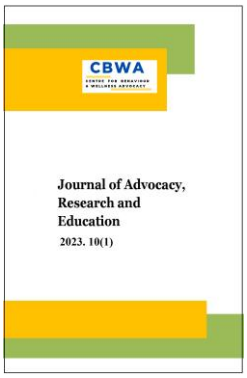

Adoption of Electronic Banking in Ghana: Does Convenience, Management Support, Security and Human Capital Matter?

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Abstract

This study looks into the elements that influence the adoption of electronic banking. The study used a cross-sectional descriptive research design to sample 347 customers who patronise the services of Commercial banks in Ghana. According to the results, users of electronic banking services believe that convenience, management support, and security are three variables that influence the adoption of electronic banking (e-banking) and, hence, the growth of their customer base. Furthermore, the study found that Human Capital, as represented by customers' level of education, impacted whether or not customers of Ghanaian banks adopted e-banking. Customers with greater levels of education appeared to be more prepared to adopt e-banking. The study suggests that marketing initiatives should focus on guiding consumers on how to use e-banking services. Additionally, banks should consider the level of education of their target market share while developing their promotional strategies. Again, commercial banks in Ghana should work to ensure the safety and security of internet transactions. This will significantly boost confidence and encourage the use of e-banking services.

Keywords: Convenience, Electronic Banking, Ghana, Human Capital, Management Support, Security.

1. Introduction

The rapid rate of change in the world of banking and finance has been necessitated by the application of technology (Boohene, Maxwell, 2017). This has brought about some fundamental variances in the banking industry. Presently, banks in advanced countries rely on information and communications technology (ICT). Conversely, this can potentially destroy the traditional ways of bank service delivery (Eshun et al., 2016). Aside from electronic banking's (e-banking) potential impact on service delivery (Guru et al., 2001; Chen et al., 2017), it also has a cost-saving effect on bank operations resulting in revenue growth and thus serving as a risk-mitigating measure for the banking industry. Despite the benefits of e-banking, a bank's decision to take advantage of this will depend on its self-assessment of its profitability and long-term effect on operations (DeYoung, 2012).

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Over the years, ICT has reportedly been extensively used in banking to advance the banking agenda (Hamed et al., 2013; Abor, 2004). To this end, most financial institutions in developing nations adopt these changing trends to stay relevant and keep their clients by providing them with more convenient and effective services. Electronic financial transfers, direct bill payments, automated teller machines (ATMs), mobile and internet (online) banking, and credit cards are just a few of the e-banking platforms and technologies that banks are adopting (Gikandi, Bloor, 2010).

E-banking has played a significant role in Ghana's competitive banking environment for over ten years (Agyei et al., 2022). According to the assessment of Addae-Korankye (2014) on the possible impact of e-banking on banking operations, he stated that banks in Ghana are embracing e-banking in some capacity to acquire a competitive edge in providing services. These e-banking services, as per Hyde (2015), may involve using the following ATMs: the internet, wire transfers, telephone banking, electronic financial transfers, and debit cards, among other things. These services appear to have led to a progressive departure from the conventional business model, defined by physical decentralization and branches positioned throughout populated areas to provide consumers with practical access to conduct business. However, physical banking offers advantages, such as trust associated with in-person service provision going on to show customers that the bank has significant human resources to protect their assets (Agyei et al., 2022).

It is interesting to note that despite the benefits associated with e-banking usage, it is also documented that customers who patronize e-banking services in Ghana experience obstacles such as high e-banking service charges, breakdown of website, low limit on funds transfer and slowness of transactions (Ameme, 2015). These difficulties pressure banks to create and use improved distribution channels to attract more clients and enhance customer loyalty. Thus, applying ICT in the business sector is one of the strategies utilized to address these expanding needs changes. For this purpose, many banks in Ghana continue to make significant investments to introduce and make effective online business services to enhance client happiness and loyalty, ultimately favourably influencing income and profits (Fozia, 2013). This suggests that e-banking has completely changed how banks operate, giving both banks and their clients enormous potential. Due to this, banks now need to switch to electronic banking to survive (Ackah, Makafui, 2014).

Based on these deliberations, this paper investigates the adoption of e-banking among customers in Ghana by introducing a non-traditional variable, human capital and accustomed variables like convenience, management support, and security to ascertain their relevance to the phenomenon. Goldin (2014) defines human capital as a term social scientists use to refer to individual characteristics deemed helpful in production. It includes knowledge, skills, know-how, good health, and education. The human capital an individual gains via education is valuable and responsive to adapt to change (Gibbons, Waldman, 2004) and contributes to an economy's collective good (Boohene et al., 2023). For this reason, this study examines, among other things, the bearing of the level of education and, for that matter, human capital on the adoption of e-banking in Ghana.

Theoretical Review

Researchers and practitioners have widely utilized the Technology Acceptance Model (TAM) to forecast and understand user acceptance of information technology (Marangunić, Granić, 2015). Focusing on cost-effectiveness and theoretical justification, TAM seeks to explain what factors into user behaviour across a wide range of end-user computing systems and user groups. The Theory of Reasoned Action (TRA) asserts that an individual's attitude drives social behaviour and helps anticipate the use of information systems (Luarn, Lin, 2005). The primary system determinants of TAM are two theoretical conceptions: perceived usefulness (PU) and perceived ease of use (PEOU).

The phrase "the degree to which a person feels that utilizing a specific system would boost his or her job performance" is used to describe perceived usefulness, while the phrase "the degree to which a person believes that using a particular system would be free of effort" is used to describe perceived usability (Davis, 1989). Additionally, several outside factors may have an impact on PU and PEOU. The system's features, learner characteristics, and environment could all be considered external variables (Wojciechowski, Cellary, 2013).

Empirical Review

Over the years, several factors have been associated with internet banking acceptability. For example, age and gender served as moderators in a study by Aboobucker and Bao (2018). They focused on barriers to internet banking acceptability in Sri Lanka. According to them, website

usability and perceived trust are potential structuring variables, although security, privacy, and perceived risk are unimportant. Similarly, Zhang et al. (2018) investigated how cultural norms in China affected the acceptance of internet banking. In high power distance countries, people are said to pay more attention to "social influence and trust" than "performance expectancy, effort expectancy, and perceived risk." In contrast, in highly individualistic countries, performance expectancy and trust are given consent in addition to taking advantage of the cultural differences.

Mobile technology and the internet have significantly simplified banking tasks in recent years by reducing the need to visit a bank. The majority of customers have arguably refused to accept mobile banking even though it is believed to be the most advanced method of banking with the benefits of quick transactions and cost-effectiveness because of security and privacy concerns, perceived trust issues, perceived risk issues, resistance, etc. (Asante-Gyabaah et al., 2015; Angenu et al., 2015). In the research on the untapped potential of electronic banking in mobile banking by Afshan and Sharif (2016), they listed trust as one of the most vital establishments. Further, Eshun et al. (2016) assert that Ghanaian banks have embraced e-banking to compete in the banking sector because of the many advantages of doing so. Additionally, clients are embracing e-banking solutions due to the advantages they have when utilizing them. Customers also believed that e-banking made doing business simpler, more convenient, and time-saving.

Again, Alalwan et al. (2016) revealed that the growth of the internet, wireless technologies, and mobile apps have inspired banks to devise innovative strategies for outwitting rivals. So far, it has become obvious that internet banking has exceeded several expectations and comfortably replaced traditional banking systems (Hamed et al., 2013). Inevitably, the fortunes of internet banking abound, and they are complementing other forms of traditional banking. Fozia (2013) posits that in a comparative study of consumer perceptions of e-banking services, customers' different age groups and occupation groups have varying perceptions of the services. The findings of Fozia also proposed that demographic characteristics, particularly occupation and age, considerably impact internet banking behaviour. On the other hand, Hamed et al. (2013) suggested that the internet is no longer a platform reserved for the privileged few but a place where the average person can access anything. Internet banking is now regarded as one of the greatest successes the world has ever known. As a result, modern bankers have made significant investments in various internet banking channels that are paying off greatly.

2. Method

Design

A cross-sectional descriptive research design was used to conveniently sample 347 customers from various Ghanaian commercial banks for the study.

Data Collection Tool

A structured questionnaire was used to collect data from respondents for the study. The first part of the questionnaire included questions about the socio-demographic characteristics of respondents, while the second part focused on the main research questions for the study.

Data analysis

Completed questionnaires were checked for completeness, coded, and entered directly into Predictive Analytical Software version 21. Data cleaning was conducted by computing the frequencies of all variables and checking for missing values and responses that were out of range. The analysis included both descriptive and inferential statistics, which generated statistical tables.

Ethical consideration

The purpose of the study and the right of every participant to withdraw at any stage of the research process without any associated penalties were explained to participants, after which consent was obtained from participants who voluntarily offered to participate. Finally, to ensure privacy and confidentiality, questionnaires were administered to the participants on an individual basis, and the data was only accessible to the authors.

Participants

The respondents in the study were those who patronize Ghanaian commercial banks. Three hundred forty-seven respondents made up the sample for this study. These served as an accurate portrayal of the clients under investigation, whose viewpoints and attitudes influenced the embrace of electronic banking in Ghana. Based on the age distribution of the participants, the majority (195, or 56.2 %) were between the ages of 20 and 29 years, and only (41, or 11.8 %) were above 40 years.

Additionally, 111 (32.0 %) of the respondents were between 20 and 29 years old, while 34 (11.1 %) were between 40 and 49 years old. Also, (248, or 71.5 %) were males, while the remaining (99, or 28.5 %) were females. Also, the majority (118, or 34 %) of the participants were self-employed and, by extension, had mainly a diploma as their educational qualification (136, or 39.20 %). The study captured respondents who patronize the services of commercial banks in Ghana from the Greater Accra Region (35 %), the Eastern Region (40 %), the Ashanti Region (15 %), and the Bono Region (10 %).

Table 1. Demographic characteristics of respondents

Variable		**Frequency**	**Percentage (%)**
Gender	Male	248	71.5%
	Female	99	28.5%
Age Group	20-29 years	195	56.2%
	30-39 years	111	32.0%
	Above 40 years	41	11.8%
Highest level of qualification	O'Level	83	23.92%
	Diploma	136	39.20%
	Degree	105	30.25%
	Masters	23	6.63%
Sector of Occupation	Public Sector	47	13.5%
	Private Sector	51	14.7%
	unemployed	32	9.2%
	Self-employed	118	34.0%
	Student	99	28.5%
Total		347	100%

3. Results

The probability of obtaining the results shown in Table 2 if the null hypothesis were true is represented by the p-value (asymp. sig.). So, if one rejects the null hypothesis, there is a 0% chance they were mistaken. In other words, the normalcy assumption is disproved because the p-value is less than 0.05. As a result, the responses to whether or not "adopting E-banking will be beneficial" do not follow a normal distribution (See Table 2).

Table 2. One-Sample Kolmogorov-Smirnov Test (N = 347)

Normal Parameters[a,b]	Mean	3.75
	Std. Deviation	1.287
Most Extreme Differences	Absolute	.329
	Positive	.166
	Negative	-.329
Test Statistic		.329
Asymp. Sig. (2-tailed)		.000[c]
a. Test distribution is Normal.		
b. Calculated from data.		

Having looked at the e-banking adoption rate, this research shifted attention to customer perception of adopting e-banking services. The study also revealed that 10.4 % of the respondents strongly disagreed (SD) to the benefit of the decision to adopt e-banking services, and 10.7 % of the respondents disagreed (D) to adopt e-banking services. Also, 3.7 % of the respondents had a neutral opinion. On the other hand, 43.8 % of the respondents agreed (A) to adopt e-banking

services, and 31.4 % strongly agreed (SA) to the benefits of adopting e-banking services. This percentage analysis suggests that, to a large extent, respondents perceive that e-banking adoption is beneficial. Furthermore, Cronbach's alpha coefficient measured the customers' responses on 17 items used for the correlation analyses at 0.790. This reflects the high internal consistency reliability for the survey, which exceeds the minimum acceptable level of (0.6).

Table 3. Principal Component Analysis

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1.	6.049	35.579	35.579	6.049	35.579	35.579
2.	2.162	12.720	48.299	2.162	12.720	48.299
3.	1.500	8.825	57.125	1.500	8.825	57.125
4.	1.482	8.719	65.844			
5.	1.293	7.608	73.452			
6.	1.101	6.474	79.925			
7.	.824	4.847	84.772			
8.	.666	3.919	88.692			
9.	.634	3.728	92.419			
10.	.496	2.915	95.334			
11.	.381	2.238	97.573			
12.	.269	1.581	99.154			
13.	.065	.382	99.536			
14.	.035	.208	99.744			
15.	.029	.170	99.915			
16.	.009	.051	99.966			
17.	.006	.034	100.000			

Table 3 demonstrates the total variance of factors used for the study. It displays the factors and their related eigenvalues. It also shows the percentage of variance explained and their corresponding cumulative percentages. Three (3) factors were extracted as they have eigenvalues greater than 1. The three factors are the convenience-related factor, Management Support-related factor and Security-related factor. The three (3) factors explain (57.125 %) of the total variations.

Table 4. Rotated Component Matrixes

Variables	**Components**		
	1	2	3
Factor 1 - Convenience-Related Factor			
1. E-banking was adopted to reduce long queues at the bank.	0.59		
2. Improved service time affected the adoption of e-banking.	0.38		
3. Convenience affected the adoption of e-banking.	0.42		
4. Flexibility of e-banking influenced me to adopt it.	0.43		
5. E-banking interactions do not need a lot of brain effort.	0.38		
Factor 2 - Management Support-Related Factor			
6. Increase in customer base was a factor in adopting e-banking.		0.37	
7. Efficient and effective customer support was a factor in adopting e-banking.		0.52	
8. Support from Top management influenced e-banking adoption.		0.47	

9. E-banking depends on providing distinctive, integrated, and personalized financial services.		0.40	
10. The bank charges low fees for using e-banking services.		0.78	
11. Availability of e-banking services contributed to the adoption of e-banking.		0.61	
Factor 3 - Security-Related Factor			
12. Security of customers' account details affects e-banking services.			0.33
13. Customer privacy policy of banks leads to the adoption of e-banking.			0.45
14. I feel using the internet/ATM banking is a good idea.			0.98
15. The security features of the e-banking platform are not weak.			0.66
16. I trust in the benefits that the decision to adopt e-banking brings. 17. E-banking is reliable.			0.77 0.37

Notes. Total variance explained=57%; Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

Convenience, management support, security, and E-banking adoption

The rotated component matrix in Table 4 presents a matrix of loadings or correlations among variables and factors. As per this study, pure loadings have loadings of 0.3 on one factor. The factors deduced were convenience-related factor, management support-related factors, and security-related factor. Regarding convenience-related factor issues such as avoidance of joining long traditional and ATM queues at the bank, improved service time, flexibility in the usage of e-banking services, and the fact that e-banking needs less brain effort were noteworthy. It is interesting to note here that although traditional queues tend to be more prevalent compared to ATM queues, the latter can also cause some inconvenience, especially when the other forms of e-banking are incapacitated. On the other hand, Management-related factors had elements such as increased customer base, efficient and effective customer support, support from top management, low charges for e-banking services, and availability of e-banking services. Aside from the other forms of support provided by management, an increased customer base implies that management is eventually forced to integrate e-banking with traditional banking services to reduce the number of customers who troupe to the bank occasionally. Further, on security-related factor, features such as assurance of security of customer details, protection of customer privacy, trust placed in security features by customers on e-banking platforms and reliability of e-banking were also noteworthy.

Human capital in the form of Level of Education and E-banking adoption

Figure 1 shows that diploma and degree holders mainly accept the decision to adopt e-banking services, with 38.82% and 28.24% of respondents agreeing and strongly agreeing, respectively. This accounts for about 66.86% of the total responses on the subject. In comparison, the percentage of those who disagree and strongly disagree with e-banking adoption for both undergraduate and master's degree holders is 0.29%. In contrast, 19.31% of respondents with O'level certificates who have lower education than those with diplomas, undergraduate degrees, and master's degrees either disagreed or strongly disagreed with the decision to adopt e-banking. This shows that those with superior levels of education were more likely to adopt e-banking than those with lower levels of education. Thus, the relationship between the level of education (Human Capital) and the use of e-banking is positive. That is, the higher the educational level of customers, the more likely customers will use e-banking services. This claim is consistent with the findings of a study by Hambrick and Masons from 1984, which showed that an employee's prior education reflected their knowledge bases and cognitive capabilities and that those with higher levels of education appeared to be better prepared to accept new ideas and adapt to changes (Asante Darkwah et al., 2023; Boohene, Maxwell, 2020; Boohene, Maxwell, 2017; Boohene, Maxwell, 2017; Boeker, 1997; Kimberly, Evanisko, 1981). The current study's findings are consistent with those made by Ainin et al. (2007), who discovered that demographic factors like age, gender, personal

income, and educational background impact whether people use e-banking services. A study by José and Inmaculada (2019) found a similar association between educational level and e-banking usage. José and Inmaculada assert that higher levels of education, income, self-employment, increased use of ATMs, increased frequency of banking transactions.

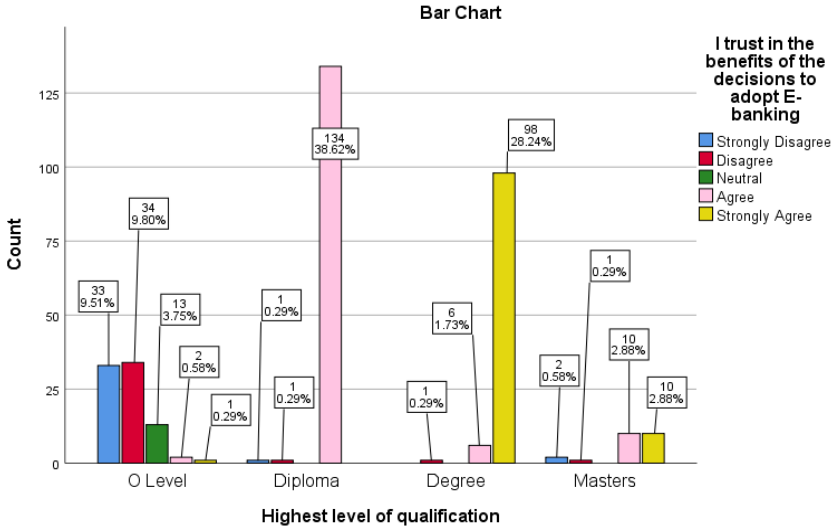

Fig.1. Trust in the Benefits of E-banking Adoption

The extent of the relationship between education level and e-banking adoption is seen in Table 5. As can be observed, the effect size for the correlation between adoption of electronic banking and educational attainment is 0.750, indicating a larger influence of the independent variable, i.e., educational attainment, on the dependent variable, adoption of electronic banking. Therefore, we conclude that a higher level of education has a larger impact on the adoption of e-banking. Additionally, the R Square of the Human Capital component (level of education) for adopting e-banking shows that the prediction ability is (0.530). This suggests a broad justification for changes relating to the two variables.

Table 5. Measures of Association

Association	R	R Squared	Eta	Eta Squared
E-banking adoption * Educational Qualification	.728	.530	.866	.750

4. Discussion

The advent of digital technology has revolutionized the banking industry in Ghana, providing individuals with convenient and accessible alternatives to traditional brick-and-mortar banking. Accessibility is one of the primary conveniences of e-banking in Ghana, as traditional banking is bound by physical branches and limited operating hours, which can be restrictive for customers. In contrast, e-banking allows individuals to access their accounts and perform transactions anytime and anywhere, as long as they have an internet connection. This convenience can cater for the busy lifestyles of most Ghanaians and provide them with the flexibility to manage their finances at their convenience.

Further, as seen from the study, one crucial factor that influences the successful implementation and adoption of e-banking is the support and commitment of bank management. When bank executives and top-level management embrace e-banking as a strategic priority, for example, by advocating for relatively low bank charges contrary to findings of previous studies, it can set a positive tone for the entire organization and, by extension, its cherished customers. Their commitment provides a clear direction and communicates the significance of e-banking to all stakeholders, including employees, customers, and shareholders.

Also, security is a fundamental factor in adopting e-banking in Ghana. The assurance that customers' sensitive data will be protected from unauthorized access, fraud, and identity theft is paramount. Most Banks and financial institutions have tried to implement robust security measures, such as encryption, secure authentication protocols, and firewalls, to ensure the confidentiality and integrity of customer data. By prioritizing security, these financial institutions in Ghana instil trust and confidence in customers, encouraging them to adopt e-banking services.

Furthermore, it is also imperative to note that while technological advancements play a significant role, the influence of human capital, specifically the level of knowledge or educational level and skills possessed by bank customers, can drive the adoption of e-banking services. Bank customers with the digital literacy and skills to navigate online platforms, use mobile applications, and conduct transactions electronically are more likely to embrace e-banking services. These individuals can effectively utilize the features and functionalities of e-banking platforms, ensuring a smooth and seamless user experience. Further, Bank customers aware of the latest technological advancements and demonstrate openness to adopting new digital solutions are more likely to explore and adopt e-banking services. Again, individuals who recognize the convenience, efficiency, and time-saving benefits of e-banking are more inclined to transition from traditional banking methods.

5. Conclusion

To improve the client experience with financial transactions, banks in Ghana set up e-banking platforms. In doing so, these banks also lower operating expenses as e-banking lessens customers' reliance on conventional banking channels. As a result, e-banking offers both banks and clients excellent potential for service delivery. Yet, regardless of this, key elements influence the adoption of electronic banking in Ghana. As per this survey, elements like convenience, management support, security systems, and human capital reflected by the level of education are some of them. Thus, bank customers generally concur that these key factors influence how widely e-banking is used in Ghana.

6. Recommendations

It is advised that marketing initiatives focus on instructing clients on how to use e-banking services, particularly internet banking. Additionally, the target market for online banking needs to be those with a respectable level of education before progressively expanding to capture the rural niche through rigorous training and education. Furthermore, Ghana's commercial banks should work to improve the safety and security of online transactions as it can significantly boost confidence and encourage the use of e-banking services.

7. Declarations

Ethics approval and consent to participate

Ethics approval was from selected commercial banks in Ghana, notably Standard Chartered Bank, Ghana and with informed consent from all participants.

Consent for publication

Not applicable.

Availability of data and materials

Please contact the author for data and materials associated with this study.

Conflict of interest statement

The authors of the manuscript declare that there is no conflict of interest, and all reference materials were duly acknowledged.

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