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TEACHING WITH DIGITAL TECHNOLOGY IN BASIC SCHOOLS IN GHANA: IDENTITIES, CHALLENGES AND IMPLICATIONS IN A DIGITAL ERA

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ABSTRACT

Though scholars have made attempts at disproving this, it is generally perceived that the present generation of students possess better digital competencies than their adult teachers. Using a qualitative, multiple case study design, this research explored Ghanaian teachers' perspectives on their students' digital identities, the challenges they encounter in usage of digital technology, as well as the implications of teaching in a digitalized era. A total of 24 teachers from public and private basic schools in Accra, Ghana was included in the study. Teachers perceived their students as digital natives based on the era of birth, technological assistance, frequency of usage and school environment. Challenges faced by teachers in using digital technology to teach included limited resources, lack of training, reluctance to change and time constraints. Findings showed the need for a paradigm shift from traditional methods of teaching to innovative modes, embracing the digital mindset, and providing platforms for students to co-construct their knowledge. Authors recommend that schools, academic related institutions and the government prioritize the usage of digital technologies for teaching and learning by formulating appropriate policies that allow technology-driven curriculum design and teaching as well as ensuring continuous professional development of digital skills of teachers.

Keywords: Teachers, Identities, Digital technology, Basic schools and Digital skills development.

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Introduction

The last few years have seen an unprecedented evolution and transformation in ICT-driven teaching and learning. Across the globe, systems particularly in developing countries were rudely awoken to the new reality that digital technologies had become the lifeline to successful and continuing education (Adarkwah, 2021). More than ever, the Covid-19 pandemic brought about the need to reimagine the role of digital technologies in education (Singh, 2021). In Ghana, and other jurisdictions, the onset of the Covid-19 pandemic further altered and shaped teaching methods and practices by accelerating the use of educational technologies and online tools. These developments have had significant implications for teachers and learners in the use of digital technologies (Agormedah, Henaku, Ayite & Ansah, 2020).

It is the popular assumption that young people are more adept at and have higher competencies in using digital technology than their parents and elders. Prensky (2001) who coined the term 'digital natives' and 'digital immigrants' discussed how the differences between 'digital native' students and their 'digital immigrant' teachers lie at the root of today's educational challenges. There are fears that teachers lack the requisite skills and capacity to adequately facilitate and enhance students understanding, use, engagement and application of technology for learning (Wang & Zhao, 2023; Tou, Kee, Koh, Camire & Chow, 2020).

Literature provides several contexts in which teachers' challenges with the use of technology in teaching are provided. In Pakistan, low speed of the internet, absence of infrastructure, limited online teaching experience and inadequate training were identified as key challenges in the use of technology amongst educators at several levels (Akram, Abdelrady, Al-Adwan, & Ramzan, 2022). The lack of training opportunities, lack of resources, and teachers' inability to use modernized technology were cited as major drawbacks in Nkengbeza, Mbuzi & Chainda (2022) study on challenges faced by primary school English teachers in Namibia in integrating media technology in the teaching and learning of English. These have ripple effects on teachers' competencies and the adoption and integration in teaching and learning.

Similarly studies in Ghana to evaluate the challenges basic school tutors face when integrating Information and Communication Technology (ICT) into their instruction and learning activities, showed limited number of ICT tools, the absence of fully subscribed software packages that run on them, the lack of electric outlets in the classroom, poor internet connectivity and power fluctuations as some of the key findings (Nettey, Osei Mensah, Asafo-Adjei & Babah, 2024; Ananga & Sakyi, 2023; Abedi, 2023; Mensah et al., 2023). Despite these bottlenecks, teachers expressed keen interest in integrating ICTs into their teaching practices

While several studies have explored the behaviours and characteristics of 'digital natives' and 'digital immigrants' (Creighton, 2018; Kesharwani, 2020; Kinkl & Strach, 2021; Demeshkant et al., 2022), there is a notable scarcity of research in Ghana focusing on basic school teachers' perspectives regarding these dynamics ('natives and immigrants') and their implications for 21st-century teaching and learning. In addition, studies have been predominantly undertaken in contexts other than Africa and Ghana and within pre-tertiary and tertiary level jurisdiction. Further, majority of studies employed quantitative methods. This study therefore seeks to address this gap by employing the qualitative method to explore teachers' perceptions on students' identities, their challenges with using digital technology to teach and the implications for teaching in a digitized era. Data gathered from this study will inform the development and implementation of strategies and support systems required by government, institutions and schools to improve and reform teachers' preparation and professional development towards harnessing technology for education.

The paper addresses the following questions:

1. What perceptions do teachers have about their students' digital identities?
2. What challenges do teachers face in teaching with digital technology?
3. What are the implications for teaching in a digitalized era?

Justification of the Study

The study would contribute to theory by operationalizing digital identities in the classroom context. By examining how teachers perceive digital identities, the study throws more light on how digital citizenship concepts apply in basic school settings. Findings will extend existing frameworks to include perceptions on 'digital natives' and 'immigrants' within the Ghanaian or African school contexts. In terms of practice, the study would contribute to a more diverse understanding of how identity dynamics influence teaching and pedagogy in both public and private schools. The findings would be useful to teachers, schools and institutions across the globe with similar educational settings and environments as well as policy makers and regulators interested in the integration of learning in basic education

Theory and Literature Review

Digital Natives and Digital Immigrants

Prensky (2001)'s digital natives and digital immigrants' theory was used as a guide for this study. The term 'digital natives' and 'digital immigrants' were formulated in 2001 by Prensky, in relation to a cohort of students whose technological savviness was distinct from that of their teachers. 'Digital natives' was used to describe a generation of individuals born after the 1980's and who had largely been exposed to digital technology and digital reality all their life. 'Digital immigrants' on the other hand referred to a group of individuals born before the 1980s. Their exposure to technological devices and tools came at a much later stage in life (Kesharwani, 2020). With early access to digital technologies, 'digital natives' usually engross themselves in a networked world and are more comfortable adopting education and digital technologies than their digital immigrant counterparts.

Several scholars however disagreed with Prensky (2001) over the subject 'digital natives', and 'digital immigrants' (Gallardo-Echenique et al., 2015; Bennett et al., 2008; Selwyn, 2009). They argued that Prensky's classifications were not based on empirical studies and that variables other than age such as the cost of using technology, the ease of its accessibility and immediacy were contributing factors to individuals' use of technology. In addition, it might be too simplistic to classify a particular generation as a distinct societal group. According to Hargittai (2010), young peoples' attitude towards technology usage was not necessarily similar. It was highly probable that youth who came from poor sociological backgrounds with no access to digital technologies could display less competency at using technology. The issue of technological divides with regards to wealth, income and family status could also be at play. Youth with lower socio-economic status may not have had the same access to technologies and therefore might have shown less savviness in usage.

Adayi et al. (2021) added that location and education factors contributed significantly to an individual's capability to effectively use digital technology and therefore found it yet again overly simplistic to maintain the stance that all young adults were technologically savvy. In addition, there could be young adults born after the 1980's who could have less skill in using information technology than their older counterparts. Watson (2013) further opined that student's usage of technologies differed from country to country and within institutions and thus students born in the digital age but who were not well exposed to technology usage within a particular geographical territory may not have exhibited characteristics of digital natives. An empirical exploration of these concepts: 'digital natives' and 'digital immigrants' in the context of a developing society is then warranted, and thus is the focus of the current paper.

Digital Gaps between Teachers and Students

Empirical research has proved inconsistencies between teachers and students regarding ownership and usage of technological devices. In some instances, teachers possessed better computer skills, than students whilst in other instances, students were better poised to embrace technology more than their teachers (Spiteri & Chang Rundgren, 2020; Jain et al. 2021).

Mogapi et al. (2023) investigated student-teacher digital divides in selected primary schools in Botswana. It was revealed that learners used technology much quicker than their teachers. Additionally, longer serving teachers were found to be less interested in the use of technology. In Nigeria, Modeme & Onwuegbuna (2023) explored the extent to which there existed a digital divide between students and teachers in the application of digital technologies during music lessons. It emerged that students were rated higher than their teachers in terms of application whilst teachers were excellent in traditional class settings.

Similarly, Tou et al. (2020) assessed and compared Singaporean Physical Education teachers' attitudes towards information and communication technologies using demographics such as age and teaching experience. Findings were that teachers' attitudes towards ICTs were significantly different between teachers of different ages and teaching experiences. In the area of modern and innovative subjects, higher scores were found among older teachers. In subjects like Physical Education, older teachers recorded significantly higher scores.

Findings from African, Singapore and European contexts above showed direct contrasts where in the case of Nigeria and Botswana, students were more knowledgeable in digital technology and information. On the other hand, teachers were more knowledgeable in Singapore and Spain, which could be explained by the strong emphasis towards technology by Singapore and Spain's governments. Government's prioritization of technology would usually translate into teachers' preparedness and practice. In addition, situational factors regarding the number of hours required by Singaporean teachers to train in professional development were very significant to these outcomes suggesting that continuous programmes were more intense and effective in such contexts.

The Future of Teaching and Learning

The forced need for acclimatizing with the aftermaths of the Covid-19 pandemic, advancement in learning technologies, and the inception of artificial intelligence have triggered a redesign of the teaching-learning processes toward approaches in which digital resources are the main protagonists in a reality according to the information society (Arora & Srinivasan, 2020). Given the nature of the challenge, digital tools and different software have been positioned as resources with better results than traditional teaching (Reimers & Schleicher, 2020; Uluyol & Sahin, 2016). Similarly, the need to promote quality education that adopts digital tools to achieve greater sustainability in education systems is highlighted in SDG Goal 4 (Tjoa & Tjoa, 2016).

From a South African perspective, Mhlanga & Moloi (2020) saw the Covid-19 period as the start of a process that will move education to the 4IR where digital learning will become the norm, with a few instances of physical or face-face classrooms. They opined that in order to be relevant in teaching and learning in the new paradigm shift, both teachers and students will need to be knowledgeable in new learning technologies. Ilori & Ajagunna (2020) whilst conducting a review on reimagining the future of education noted that the dawn of smart communication systems, artificial intelligence, robotics, virtual reality and digital textbooks have provided a new outlook to what is learnt in schools. Just as technologies brought about smart communication systems, the 4th industrial revolution model education is rapidly evolving and as such, curriculum development and review must be dynamic, and it must keep pace with the technological advances and skills required in the 21st century.

In a study in South Africa, which investigated the pedagogical paradigm shift in 21st century teaching and learning in secondary schools, findings showed that teacher-centered pedagogies were continually in use as the main instructional style and nonetheless, pre-empted passiveness on the part of learners (Sikhakhane, Govender & Maphalala, 2020). There seemed to be a compromise on active learning approaches and making meaningful intellectual gains. Teachers mentioned the absence of support in terms of computer hardware and software. In another vein, a Ghanaian study explored the adoption of a new and innovative curriculum grounded in 21st century pedagogy (Takyi, Korankye & Akobila, 2025). It however emerged that there was a need for a reform of the system that extends beyond transforming the curricula. While teachers received innovative and learner-centred training, their classrooms remained rigid and overcrowded. There was a call for education policy makers to design pedagogical reforms with investments in the physical learning environment. Both Ghanaian and South African studies mirrored how context influenced the success of moving into new

and innovative paradigms of teaching. In both cases, training may have equipped teachers with learner-centred approaches, nonetheless the lack of adequate spaces and infrastructure did not enable the intended teaching approaches to materialize. This beckons for an alignment between pedagogical reforms and investments in the physical environment.

The research questions which are grounded in the three thematic areas in the literature above provide a holistic framework for understanding teachers' and students' identities and digital technology usage as well as future implications for teaching practice within a Ghanaian context. The future of teaching and learning cannot be separated from the digital eco-systems that teachers inhabit and from the interpretations that they bring to these ecologies. By placing these intersections within the discourse of digital identities, digital gaps between teachers and paradigm shifts in teaching, the study aims to generate evidence-based guiding information that would support more equitable, effective and future oriented digital teaching.

Materials and Methods

This is a qualitative study that employed a multiple case study design. Teachers' views were explored in-depth, from public and private school settings. Teachers were selected from 2 public and 2 private schools. The study employed extreme or deviant case sampling method in selecting the schools. The reasoning behind Extreme Case sampling is that lessons may be learned about unusual conditions or extreme outcomes that are relevant to improving more typical programmes (Patton, 1990). In this regard, the study explored teachers' perceptions regarding students' identities and their challenges with digital technology from the supposedly well-resourced schools (private) and the less- endowed schools (Public). These two categories of schools are classified as extreme in nature: Public basic schools in Ghana are characterized by lack of infrastructure, resources, and financial dependence on the public purse. Whereas the private schools are supposedly better endowed, more financially independent and are believed to achieve better academic results.

Each category of schools selected offered a rich context for studying identities and challenges in usage of digital technology from different divides. Only two schools were selected in each category due to limitation of funds, convenience and proximity.

Homogenous sampling technique was also adopted. Selection criteria were based on teachers who taught between Junior High School (JHS) levels 1-3 in public schools and between years 7- 9 in private schools. This allowed participants with similar experiences to share their stories on digital technology usage. 6 teachers were selected from each school. Altogether 24 teachers were sampled.

Participants

A total of 24 teachers participated in the study. 6 teachers were selected from each school (2 public and 2 private). There were 14 male teachers and 10 female teachers. Teachers' ages ranged between 27 and 57 years for public schools and 24 and 60 years for private schools. Teachers were selected from varied subject areas including Math, English, Integrated Science, Physics, Chemistry, Social Studies, Home Economics, French, Religious and Moral Education, Information

Communication Technology (ICT), Music, Business Studies, Basic Design Technology and Physical Education.

Study Context

The phenomenon of using digital technology was explored from the supposedly well-resourced schools and the less-endowed schools. Public schools in Ghana are characterized by a lack of infrastructure and total dependence on government support whereas private schools are better resourced and financially independent (Opoku, Cuskelly, Pedersen & Rayner, 2021).

Data Collection Procedure

In-depth interviews were used. The use of in- depth interviews in this study allowed the unearthing and exploration of views, beliefs and deeper meanings offered by teachers about their students' identities, their challenges in using digital technology to teach and the implications of teaching in a digital era. A semi-structured interview guide with open ended questions were used (Please find attached interview guide in the appendix). Interviews were conducted privately and lasted about 45 minutes to an hour. Participant's submissions were audio recorded.

Data Credibility

A code-recode strategy was employed. The same data was coded twice, giving two weeks' time interval between each coding. The results from the two codings were compared to see if they were similar or different. Results showed very minimal differences. We applied the member-check principles to enhance data credibility. We also engaged in peer reviews to validate the truthfulness of data. We used Turnitin software to conform to the data similarity index standard, 20% with regards to University of Ghana policy.

Ethics

Participants showed their willingness to be part of the study by signing consent forms prior to the start of the research. Participants were assured of anonymity and confidentiality. Steps were taken to ensure that participant's submissions were not traced to their names. Any information that had the potential of identifying its source were anonymized during transcription. Ethical clearance was granted by the Ethics Committee for the Humanities (ECH), University of Ghana ECH 115/17-18).

Data Analysis

According to Attride-Stirling (2001), "If qualitative research is to yield meaningful results, it is imperative that the material under scrutiny is analyzed in a methodical manner...." (p.386). In view of this, we made use of Braun & Clarke (2020) six-step process of engaging with data, coding and developing of themes known as thematic analysis. It was an iterative process and we engaged in reflexive introspection to comprehend, interpret and gain insights into the data (Trainor & Bundon, 2021).

The first step involved repeatedly playing and transcribing the audio recordings. This was followed by reading the transcriptions and evaluating them in order to identify patterns of connectedness (Miles, Huberman & Saldana, 2014). The next step was the code generation phase, where initial codes were generated. This stage involved coding categories in the data and organizing all the occurrences of text in the data where that code occurred (Clarke & Braun, 2013). The generated codes were subsequently organized and grouped into themes which were then examined, labelled and defined to correspond with the study's research questions and pertinent literature. The themes were further categorized into sub-themes with each sub-theme representing different aspects of the main themes. This formed the basis of analysis for the study. The final phase focused on completing the report, during which we incorporated direct quotes from the participants to illustrate the different sub-themes. Table 1 provides a summary of the themes, sub-themes and examples of the narratives from the participants.

Findings

In this section, we present the findings of this study. Three main themes emerged: Defining digital natives, challenges with using digital technology in teaching and transforming teaching practice for digital natives. Please find a table of summaries below. The findings are discussed under sub-themes. Each sub-theme is supported with direct quotes from participants.

Table 1: Summary of Main Ideas

Main Theme	Sub-Themes	Summary of main ideas from data/ codes	Quotes
Defining digital natives	• Time and Era of Birth	• students more responsive and skillful due to the time and era in which they were born	<i>..., they were born in an era where social media is the thing. (PV T 8)</i>
	• Technical Assistance Offered to Teachers	• students displayed more superiority by informing teachers about new tools and assisting them during class.	<i>.... Sometimes they assist us, you know in trying to set up these tools for teaching for them. (PVT 1)</i>
	• Frequency and Regularity of Use	• teachers had limited, whilst students, had ample time at their disposal to engage in online activities	<i>They are always with the mobile phones.We don't have time, we're always struggling for time to do other</i>

Main Theme	Sub-Themes	Summary of main ideas from data/ codes	Quotes
	- School environment and social background - Social media natives, not digital natives	- Students from more endowed school environments were likely to be digital natives - Students were rather adept at using social media applications and not digital tools	<i>things, etc. (PB T 6)</i> <i>..... when you look at their economic backgrounds, it is very low and so for them, they can't have easy access to digital tools.....(PT 4)</i> <i>I wouldn't say they are natives... but the only one they'd be used to is this normal Facebook, WhatsApp, chatting. (PBT 3)</i>
Challenges with using digital technology in teaching	- Limited access to resources - Reluctance to change - Time constraints - Lack of training	Difficulties using technology to teach due to lack of infrastructure. - Teachers were more comfortable sticking to their traditional way of doing things. - Teachers saw the use of digital technology as a hindrance to timely completion of syllabuses. - Teachers attributed their lack of efficiency in usage of	<i>... the school does not have a single computer for the students. (PBT 6)</i> <i>some of us may be reluctant to adopt new teaching methods or technologies due to comfort with traditional approaches. (PBT 3)</i> <i>So, the fear that it will slow down the teaching is a hindrance (PVT 5)</i>

Main Theme	Sub-Themes	Summary of main ideas from data/ codes	Quotes
		digital tools to limited digital skills training	<i>...to be honest we do not have regular training on digital skills acquisition. (PBT 6)</i>
Transforming teaching practice for digital natives	- Shifting from traditional to new methods of teaching - Students becoming partners in constructing knowledge. - Embracing a digital mindset	- Teachers to adopt modern paradigms of teaching and pedagogy and move from traditional methods - Shared responsibility with students through active engagement, discussions and shared experiences - Teachers required to be open minded and adaptable to new technology.	<i>It means teachers of this time should channel more of their teaching through digital means that already interests students (PVT 6)</i> <i>Now we are moving from the age of lecturing to facilitation (PVT 6)</i> <i>We must be thinking digital going forward and that means that we should embrace new knowledge and new ways of thinking (PVT 3)</i>

Research Question 1: What are teachers' perceptions about their student's digital identities?

Natives by Virtue of Time and Era of Birth

Views sampled from respondents showed a diversity in opinions in teachers' beliefs about their student's digital identities. Teachers in both public and private schools classified students as "Natives" based on the time and era in which they were born. A teacher in a private school shared her opinions:

...the kinds of things that you struggle with, they'd just get it done and because it came at their time and they're in tune with technology...(Private School Teacher 2)

.... they were born in an era where social media is the thing. For some of them, their whole world is social media,.... (Private School Teacher 8)

A teacher in a public school noted:

They were born in an age where technology has become the order of the day, it's everywhere, so they are very comfortable and conversant with everything on the phone, (Public School Teacher 6)

They argued that some of them (teachers) got to the university before using electronic gadgets like computers, iPad, phones, etc. Thus, students proved to be more responsive and skilful in anything technological due to the time and era in which they were born.

Natives by Virtue of Technical Assistance Offered to Teachers

Teachers in public and private schools noted that students could be categorized as natives based on the assistance and support they sometimes provided teachers during the course of work. They indicated that most students were quick to learn on matters of technology. Some private school teachers commented:

.... sometimes they assist us, you know in trying to set up these tools for teaching for them, so I think it's very true, they are quick to learn some of these things. (Private School Teacher 1)

even at times when we're using our laptop or the internet or other things in the class, we get stuck on the way and we have to invite some of them to help us out. (Private School Teacher 5)

Similar sentiments were expressed by teachers in public schools:

My child was going to the café and I didn't think it was a good idea because they do play other games, so I even beat him concerning it. But then later I realized that his going there even helped me because at times when I need some information from the internet, I fall on my child for assistance. (Public School Teacher 2)

According to the teachers, students displayed a lot more superiority in knowledge by informing them about new and latest apps and by providing direction to them on how to access and use these apps.

Natives by Virtue of Frequency and Regularity of Use

Discussions further centered on how actively students and teachers patronized technology platforms and online applications. Teachers perceived that student

spent a lot of time engaged on the internet through social media. Teachers remarked:

They are often on WhatsApp most of the times even in class. You know interestingly one of them was asked in a Geography class what they'd consider before they move to a new settlement well the first thing the person mentioned was wi-fi. (Private School Teacher 4)

"Whenever I go on social media, I see them all over there. Sometimes I leave and they're still there, so I believe they're more inclined to it, they use it more than us." (Private School Teacher 2)

Another teacher remarked:

They are always with the mobile phones. They are ahead, far ahead, they will hear the news before us. We ~~the elderly ones~~ don't have time, we're always struggling for time to look after children, do other things, etc. (Public School Teacher 6)

Teachers noted that students were far advanced. They opined that the amount of time spent on technology-based activities and the frequency of use of these gadgets and online platforms gave them an upper hand when it came to use of technology.

Natives by Virtue of Social Status and School Environment

Teachers observed that the environment and social backgrounds or setting of the students and teachers were key factors that determined whether they were technologically inclined, or not. A teacher commented:

In our school, social media is used for about 40% of our work so if you're in the international school environment and you learn to adapt, you'd be able to get to your students, because that's their major form of communication and they respond better and so we also try our best to catch up with them. (Private School Teacher 3)

On the other hand, public school teachers noted that their school policy did not allow students to bring or use digital gadgets in school and therefore did not support development of digital skills of both teachers and students. Furthermore, they did not have adequate infrastructure. An interviewee commented:

When they come to school, we don't allow them to use the gadgets. They only use the computer when they have ICT. This is the situation where they go to the lab and they don't have sufficient laptops or the computer, so you see that they can't be "natives" due to their school environment. (Public School Teacher 5)

Other teachers noted:

Those who are from good homes have been exposed right from infancy. But if you have the kinds of children we have here when you look at their economic backgrounds, it is very low and so they can't have easy access to digital tools...(Public School Teacher 4)

Discussions centered on how the socio-economic background of students also mattered in issues of technology. Teachers from public schools argued that students within the setting in which they found themselves usually came from very poor backgrounds.

Social Media Natives, not Digital Natives

Interestingly, some teachers disagreed with the assertion that most students were "digital natives" whilst teachers were immigrants. In their view, students were only adept or skillful at using social media apps like WhatsApp, Facebook, Instagram, Telegram, etc. They rather classified students as "social media natives" and not "digital natives".

Because I know students in terms of using the social media apps like WhatsApp, Instagram, they are more abreast with the times. But ~~let's say~~ if you're talking about other technology, let's say Word, Excel, PowerPoint, and maybe other applications, students might be found wanting...(Public School Teacher 5)

I wouldn't say they are natives. I don't know, but the only one they'd be used to is Facebook, WhatsApp chatting and aside that, I don't think they use it for any beneficial things. From my observation, they are not really Natives (Private School Teacher 3)

Other teachers shared further reasons why they felt teachers were more of "natives" than their students.

knowing a lot more about social media and being on the internet, doesn't mean that they know all the online security and safety etiquettes. As teachers, we make it our duty to guide them because as much as they are there, they don't know how to secure some of their data and other things... How can immigrants guide natives? (Public School Teacher 3)

Research Question 2: What challenges do teachers face in using digital technology to teach?

Limited Access to Resources

When asked about their setbacks with using digital technology, teachers responded that limited access to resources was one of the major challenges they experienced in schools. The cost of accessing these digital tools were a major deterrent to their access and usage

the physical cost, a real challenge for us. Apart from that, the cost of purchasing the internet bundle is also a deterrent for us in the basic schools. (Public School Teacher 1)

To the teacher in the public school owning a laptop comes at a cost, bundling internet comes at another cost. So the cost alone is enough to put the person off from accessing these devices. (Private School Teacher 3)

A French teacher shared her sentiments on the non-availability of gadgets and devices for teaching:

For instance, though we have an ICT teacher, the school does not have a single computer for the students. So it is the ICT teacher who brings a laptop to school and then goes round almost all the classes... (Public School Teacher 6)

A mathematics teacher in a public school shared his opinions:

We don't have a computer lab. The building down there is supposed to be a computer lab. but it has not even been commissioned (Public School Teacher 3)

The narratives above highlight some of the difficulties teachers faced in utilizing technology in the classroom. There was lack of physical and technological resources leading to low usage in teaching.

Reluctance to Change

Teachers attitude to change emerged as a major setback in their usage of digital technology. Some of them explained that change was not an easy transition to make especially when they were very much used to their traditional methods of teaching.

A private school teacher commented:

....it's not that we don't like it or do want to use it but the difficulty is in the transition. (Private School Teacher 4)

Still sharing their views on the subject, private school teachers believed getting used to innovations and new things was a major challenge. Some of them reported:

I think some teachers don't easily adapt to change. They would rather say "This is how I always do it". So if there's a new style of doing it they feel reluctant to try it, openness to new technology, to new things that are coming (private school teacher 1)

I think some of us may be reluctant to adopt new teaching methods or technologies due to comfort with traditional approaches. (Public school teacher 3)

Getting used to new technologies was not that simple for teachers, especially when resources were not readily available. They were not too conversant with the use of digital tools or technology and would rather stick to their usual way of doing things.

Time Constraints

Many teachers saw the use of technology in teaching as time-consuming for various reasons: these included slowing down teaching, inability to finish the syllabus on time, extra time spent in preparation for lessons, and time spent staying updated with modern trends. A science teacher narrated:

We sometimes think it's going to slow down our teaching So, the fear that it will slow down the teaching is a hindrance (Private School Teacher 5)

We have a syllabus to complete within a certain time, specifically when we're teaching final year students. So if you always have to resort to technology, it would take away your time...(Public School Teacher 1).

A teacher in A private school teacher maintained that although they made use of digital tools and e-learning in their school, they spent a lot of time planning lessons carefully integrated with e-learning and digital technology, which took a lot of time and effort.

I have to be honest... sometimes, finding the time to plan lessons that use technology can be challenging since we have other teaching responsibilities. (Private School Teacher 4)

Incorporating technology into lessons often requires additional preparation. Teachers may need to create digital resources, set up online platforms, or customize learning materials, which can be more time-consuming than traditional methods.

Lack of Training

Teachers bemoaned the fact that they sometimes lacked the efficiency in fully utilizing digital technology due to their limited knowledge. They argued that they hardly engaged in training that allowed them to improve upon their skills. A teacher explained:

...to be honest we do not have regular training on digital skills acquisition. Our incompatibility with these tools sometimes

makes us shy away from using them...(public school teacher 6)

They believed they needed more awareness and knowledge on its usage, how to regulate its use by students during classes and how to make learning more engaging and relevant.

because some of us do not have knowledge about these things, it would be difficult for us to use them. I think creating more awareness and sensitization through training on the many ways it would help us in teaching would be the way forward.....(Public school teacher1).

Another teacher shared her experience and believed that the lack of training resulted in their adherence to their old methods and traditional modes of teaching:

It is quite disturbing for some of us because I want to be able to use it in teaching. I know its benefits, but I am constrained by the lack of knowhow.....the lack of training is a challenge for us (Public School Teacher 4)

Teachers in private schools however shared different views on the subject: they went through regular training and had to continuously update their skills in order to keep up with modern ways of teaching. Some teachers shared their experiences

We teach the IGCSE curriculum and because of the environment in which we find ourselves, we have regular trainings on digital technology. We go for trainings on a monthly basis. In fact, if you teach here you have to be abreast with modern trends. (Private School Teacher 3)

Training is an integral part of what we do here. We actually see it as part of our professional development as teachers. Apart from that most of the students here are technology savvy which means that we have to keep up with new knowledge (Private School Teacher 5)

Teachers in private schools saw training as an essential intervention that could bridge the gap in their digital competencies. In their view the training would provide more awareness and enable them develop significant skills that would improve their output as educators.

Research question 3: What are the implications of teaching in a digital era?

Shifting from Traditional Methods of Teaching and Learning to New Methods

Respondents shared their opinions on what they thought would be the implications of teaching 21st century students and students who in some cases were more technologically advanced. A private school teacher narrated:

The traditional way of teaching, white board to students and then the teacher does the talking all of the time is gradually

fading. With all these media available you give the children the steps to accomplish them, and all you have to do is just be there to direct them to find the answers. (Private School Teacher 1)

Teachers remarked that the old methodologies of teaching were phasing out as students easily got bored and disinterested. From their viewpoint, facilitating and directing lessons using technology, including social media and online research enabled teachers communicate their messages effectively and generated sustained interest in lessons.

It means teachers of this time should channel more of their teaching through digital means that already interests students but if maybe we're using the old methodology which doesn't interest them, then you'd find it difficult to get their attention. (Private School Teacher 6)

A public-school teacher shared her views:

It means that teaching is taking a different turn and the old way of doing things must give way to the new, if the best means that you have to go the way of technology which is the current trend, then why not? (Public School Teacher 2)

Another private school teacher shared his views:

The traditional kind of teaching is past and gone. As teachers we should read the trends. You may not have a projector or interactive smartboards, but in your own way, you can print those things that you want to use as teaching and learning materials and resources, bring them to class when they see it, it's better than they imagining it...(Private School Teacher 3)

Comments from respondents re-emphasized the need to change methods and synchronize with that of latest technology and trends. Traditional teaching methods in their view should give way to newly enhanced learning methods. Other public-school teachers remarked:

If the world is changing, we have to change with the world. If everybody is gearing towards technology, as teachers, we must find a way to modernize our old systems so we can also be abreast with time... (Public School Teacher 2)

Teachers appreciated the added value of teaching with technology and thus stressed the need to embrace it wholly. They saw the need to adapt to education trends globally and thus believed in moving towards new paradigms of learning,

Students Becoming Partners in Constructing Knowledge

Findings revealed that teachers believed that teaching digital natives would mean students should be co-constructors of knowledge. This meant teachers would

provide support to students and guide them towards finding information and using information.

Now we are moving from the age of lecturing to facilitation. We support students to learn on their own and we are there to make corrections, to help them navigate, finding information for themselves. (Private School Teacher 6).

There's a new reality we must face if we want to teach our native students.... gone are the days past when as students, you only got access to what your teacher told you... but they also learn from other sources and share with us. (Private School Teacher 4)

Some teachers noted that this aspect of the learning enables students to challenge the status quo especially where there is the opportunity to compare information sourced with what teachers present. A public-school teacher shared his experience:

And sometimes students can challenge you.... So, if you don't factor all these as a teacher, you'd probably look incompetent. (Public School Teacher 6)

The narratives suggest that teaching digital native would imply shared responsibility with students where both parties actively engage in discussions, share insights and perspectives and contribute to the learning experience.

Embracing a Digital Mindset

Teachers reiterated that there was the need for them to be adaptable and open to new digital tools and embrace the right mindset for teaching with technology. According to some teachers:

whether we like it or not, we as teachers should have an open mindset about using technology in the classroom (Public School Teacher 1)

This would mean that we as teachers do continuous training. We must be thinking digital going forward and that means that we should embrace new knowledge and new ways of thinking that allows us to see the possibilities of making digital technology a part of our day-to-day instruction. (Private school Teacher 3)

Participants also saw the need for school management to be visionary by thinking digital and by finding ways to integrate technology into the entire curriculum. Management having a digital mindset would mean they would encourage teachers' acquisition of digital skills.

Well, the school management must have a vision that embraces digital technology in teaching and learning. (Public School Teacher 4)

Here is the case where in most basic schools, phones and digital gadgets are banned in schools. If our educational institutions under the government prioritise digital education, then it would be easier to get policies that support its usage in schools (Public School Teacher 3)

For the teachers, embracing a digital mindset meant a number of things: adapting wholly to usage of digital technology, continuous training and development and prioritization of digital technology in schools. This would lead to compatibility of use of digital tools, upgrading of teachers' skills, implementation of policies for digital tools usage, which would result in more effective integration in schools.

Discussion

The study investigated teachers' perceptions on student's identities and its implications for teaching and learning. It also explored the challenges teachers faced when employing digital technology in the classroom. Teachers argued that by virtue of the social media era in which students had grown up, students were more conversant, confident and knowledgeable than some of their 'immigrant' teachers. These assertions by teachers corroborate prior study (Wang and Zhao 2023). These align with Prensky's claim of 'native' students being more comfortable with digital tools and have implications for practice: 'native' students may drive demands for technology enabled and instructional approaches. Nonetheless, these findings contrast with previous research conducted by Tou et al. (2020) where older teacher's attitudes towards technology recorded higher scores than students. These differences could possibly have been the result of the existence of government regulated ICT policies that supported the professional development of teachers in public schools in previous contexts. Thus, Prensky's assertion may be overgeneralized as context and not just age, may be much more of a stronger determinant of digital competence.

Teachers categorized their students as 'natives' based on the technical support and assistance they received from them. Findings revealed that students were very quick at learning to use gadgets and even though teachers were trained in technology usage, the students seemed to learn faster, adapt and help their teachers in the use of the gadgets. These support the findings of Mogapi et al. (2023) and Modeme & Onwuegbuna (2023). In the current study, Teachers identified reasons for this: They believed students had a lot more time than their teachers who were preoccupied with other adult life engagements and therefore had less time to spend online; this also supports prior study (Kesharwani, 2020). When students consistently exhibit ease of use of digital tools, it could be interpreted as aligning with Prensky's assertions of 'digital natives'. However, teachers need for technical support may not be a good measure for classifying students as having 'native'-like digital capabilities. It could more often be indicative of the differences in exposure and access or familiarity with specific tools. Practice implications are that specific technical areas where teachers require support should be identified and professional development should be geared towards pedagogy for technology integration and not just accessing and usage of digital devices.

Interestingly, findings from the current study revealed that teachers believed students were social media 'natives' and not particularly 'digital natives'. This distinction echoes Prensky's core ideas but introduces some nuance. Teachers

suggested that students' strengths did not lie in formal educational or digital technologies but rather in the use of social and online communication tools. This is indicative of gaps between everyday digital fluency and digital literacy for the classroom. This has implications for designing digital literacy and education curricula that integrate informal digital competencies with digital tasks required in the classroom. That is designing assignments that would enable students transfer skills from social media to academic work.

Further, the study revealed that context was key in determining the disposition of teachers towards the use of digital technology. Within the private schools, teachers had an enabling educational environment, available information technology infrastructure, well trained teachers, and digital usage policies that enabled students thrive within the digital space thereby supporting their development of digital skills. On the other hand, within the public schools, conditions were not enabling as a result of lack of infrastructure, low technical expertise of teachers and lack of policy on usage of digital gadgets in schools. These findings corroborate that of Adayi et al. (2021) and Masoumi & Noroozi (2023) who attributed teachers' lack of competencies to limited resources and institutional support. The 'native' 'immigrant' distinction becomes insufficient in view of the environment. Though Prensky (2001) claims their generation classifications should put them in the category of 'digital natives', teachers in better resourced environments may develop higher order digital skills faster than teachers in poorly resourced setting. As regards policy, there is the need to ensure equitable access for teachers across schools particularly public basic schools.

Narratives on implications of teaching students in an era marked by digitization and technological transformation revealed that there was a need for a paradigm shift from traditional methods of teaching and learning to new and innovative approaches. Scholars including Ulla & Perales, (2021), Yates et al. (2021), Tashtoush et al. (2023) support these findings. Teachers' advocacy for innovation aligns with the need to leverage technology-rich student- centered strategies that Prensky (2001) identifies with 'native'-like use of digital tools in education. Effective innovation implies the alignment of technology, pedagogy and content and more attention given to digital literacies, equity and assessment. Policy directions should focus on creation of guidelines for monitoring and evaluation of innovative practices.

Our Findings suggest that teachers, schools and institutions should fully embrace the digital adoption mindset. These are supported by related research by Dakhi et al. (2020) and Liesa-Oruse et al. (2020) whose recommendations suggest same. Fully embracing the digital adoption mindset entails being adaptable, learning continuously, and having a learner-centred orientation, which extends beyond the 'native/immigrant' dichotomy. This calls for the extended support of government and regulating institutions to develop clear expectations of what a digital mindset is in the practice. It also beckons the need for schools to implement and report on digital mindset initiatives.

Limitations and Direction for Future Research

The study was conducted in two public and two private schools using a qualitative interview with few research participants and thus limiting its generalizability. Findings may be context specific and therefore cannot be extended to larger populations. We suggest future research on a quantitative basis involving a much

larger spread of population and schools to test the themes that emerged qualitatively. For example, testing the proposition that teachers' interpretations of students' digital identities inform their instructional choices and classroom management. Furthermore, future studies could test whether contextual factors influence the relationship between teachers' perceptions and implications for teaching.

Conclusions and Recommendations

The study sought to investigate teachers' experiences with digital technology usage by finding out their perceptions on students' identities, the challenges they faced in using technology in the classroom and the implications of teaching 'digital natives' in a digital era. Prensky's (2001) theory on "digital natives' and 'digital immigrants'" served as the framework and significantly shaped the conclusions. The study's findings partly confirmed the 'digital native' and 'digital immigrant' assertion by suggesting differences in familiarity with and access to technology.

The study also highlighted significant limitations of the theory. Rather than adhering to a strict age-based categorization, the study found that the 'digital native' 'digital immigrant' label was assigned based on contextual exposure such as school environment, assistance and frequency of usage. This suggests that the theory's age-based distinction may not be universally applicable, particularly in contexts where access to technology is limited. In the Ghanaian context, disparities in access to technology were found to drive teachers' classifications rather than age. This finding underscores the need to consider contextual factors when applying Prensky's theory. Furthermore, the study revealed physical, institutional and structural limitations that can hinder technology adoption, regardless of age or digital inclination. These limitations highlight the importance of access and training in facilitating digital adoption.

The study's findings also suggest that infrastructure, access and capacity building are crucial factors of digital adoption, rather than just age or 'native' 'immigrant' status. This challenges the simplistic rendering of Prensky's theory, which suggests that 'digital natives' will naturally possess technological savviness. Instead, the study shows that those labelled 'natives' may not effectively leverage digital technology without adequate access and training,

Moreover, the study found that teachers' readiness to integrate technology indicates a shared belief in technology enhanced learning, which transcends the 'digital native/immigrant' dichotomy. This finding suggests that educators are willing to move beyond traditional paradigms and adopt more innovative approaches to teaching and learning. Overall, the study's findings suggest that Prensky's theory should be extended to account for contextual factors, access and training. Rather than relying solely on age or generational differences, the theory should be nuanced to reflect the complex realities of digital adoption in diverse contexts. By acknowledging the importance of infrastructure, access and capacity building, educators and policy makers can work to create more inclusive and effective technology-enhanced learning environments.

We recommend:

1. Government prioritizes the use of digital technologies in basic schools through the development and implementation of curricula that are technology- driven.
2. The creation of policies that allow the use of digital tools in schools and offer teachers the flexibility and confidence of teaching with digital technology.
3. Educational institutions should collaborate with management of basic schools to organize regular training and engage all-inclusive interventions to develop teachers' capacity (young and old) in digital teaching.
4. The promotion of digital literacy through its incorporation in syllabuses, teaching pedagogy and daily teaching tasks in schools coupled with the implementation of professional development programmes and training workshops.
5. As additional interventions in schools, the creation of mentorship programmes where tech-savvy students could be paired with their teachers and for the exchange information and strategies

Teachers' competencies and skills are critical to teaching in a technologically revolving world. It is necessary therefore, to place priority in developing their digital skillsets to enhance a fuller learning experience for students and to enable teachers confidently play their role in co-constructing knowledge with their 'digital native' students. To engage 'digital natives' effectively, teachers should speak their language and therefore should be prepared with the requisite skills that will enable them effectively meet the needs of the 21st century learner.

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