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DIGITAL NATIVE ASSESSMENT SCALE: REVISITING THE CONCEPT OF DIGITAL NATIVENESS FROM TEACHERS' RESPONSES

Fitri Agustin*, Nenden Sri Lengkanawati, and Ahmad Bukhori Muslim
English Education Study Program, Universitas Pendidikan Indonesia, Indonesia

***Corresponding author's email address: agustinfitri78@gmail.com**

ABSTRACT

The phrase "digital native," which is used almost universally to describe the use of technology by today's teachers and students, is laden with debate both regarding its meaning and how it should be measured. The Digital Natives Assessment Scale (DNAS) was established, developed, and validated to assess "digital nativeness." This study contributes to the ongoing dispute regarding the validity of the DNAS, reported in the previous literature. This study aims to critically analyze digital nativeness frameworks of the Digital Natives Assessment Scale (DNAS), especially in education context. By showing inconsistencies between the DNAS and observed behaviors among Indonesian secondary school teachers, it highlights the need for novel approaches to conceptualizing and assessing digital nativeness to improve global educational practices. Seventy-eight Indonesian secondary school teachers joined the survey and two of the respondents were invited to join the semi-structured interview. The findings of the study provided the data for the examination of how the DNAS addresses the factors that contribute to digital nativeness. The results from the DNAS corroborated Wilson's claim that the DNAS may not address the features of digital natives. This study recommends that future research in the realm of educational technology and beyond should concentrate on different ways of conceiving the concept of digital natives.

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1. INTRODUCTION

In contemporary society, it is broadly recognized that digitalization influences almost every facet of life. The integration of Information and Communication Technologies (ICTs) has profoundly shaped digital culture, which is now intricately woven into everyday activities and educational methodologies. As a result, possessing digital skills has become crucial for meaningful engagement in today's society (Gallardo-Echenique et al., 2017; Hämäläinen & Cattaneo, 2019). As daily life evolves into a more digital landscape, it is essential for all individuals in society to adjust and acquire the skills necessary to navigate digital technologies (Llorente-Barroso et al., 2023).

The current state of human existence is profoundly influenced by a variety of digital activities, leading to an unavoidable dependence on enhancements in digital cognition. This improvement is apparent in all professions, even in traditionally non-technical areas such as law and the humanities, supported by tools like laptops, online databases, virtual simulations, collaborative online platforms, and various context-specific digital resources. In the classroom, there has been a shift from traditional methods to the incorporation of technology (Taskiran, Koral Gumusoglu, & Aydin, 2018). The integration of advanced ICT facilitates multi-modal, collaborative, and poly-synchronous interactions between teachers and students (Huang, Liu, Tlili, Yang, & Wang, 2020). Modern classrooms are increasingly dependent on digital communication tools, with the effectiveness of teacher-student interactions hinging on their proficiency in digital communication. While there are differing viewpoints regarding the incorporation of technology and the continuous pursuit of effective application, it is an undeniable fact that technology will consistently influence numerous aspects of human life, including EFL classrooms (Setyaningsih et al., 2020).

According to Prensky's dichotomy (2001, 2009), current English as a Foreign Language (EFL) teachers in secondary schools can be categorized as either digital native teachers (DNs) or digital immigrant teachers (DIs). There is a significant gap in the levels of digital literacy between the two groups of teachers. Teachers who are considered to be Digital Immigrants are those who are older than 35 years of age, are resistant to picking up new technologies, and tend to have negative attitudes toward mobile devices. Teachers who are considered to be Digital Natives (DNs) are those who are younger than 35 years of age, who share digital native characters with students, and who look headed toward increasing technology integration (Howlett & Waemusa, 2018). The diverse educational operating systems and varied ways of interacting with technology are reflected in the different characteristics that are possessed by the two separate subsets of teachers.

Prensky is widely credited with coining the terms "digital natives" and "digital immigrants," which arose as new concepts in the age of digital technology (2001). However, Prensky's definition of digital natives based on their birth year has been disputed, and counter-positions have emerged in recent years, despite the fact that Prensky's definition is commonly referenced (Teo, 2015). Scholarly discourse remains divided regarding the identity of these digital natives, with Prensky's birth year-based definition facing significant scrutiny in recent years, prompting the development of alternative viewpoints. It is argued that merely linking technological proficiency to age fails to consider significant elements, including socioeconomic status, educational opportunities, and personal involvement with digital tools (Greenhow & Lewin, 2018). As a result, an increasing number of individuals are calling for a more sophisticated understanding of "digital natives" that takes into account varying skill levels and digital literacies that transcend generational boundaries. Furthermore, researchers emphasize that digital skills are influenced more by contextual and experiential elements rather than solely by age, necessitating a reconsideration of the concept in the context of changing technological environments (Helsper & van Deursen, 2017).

A critical inquiry for policy and practice concerns whether an individual's status as a digital native is influenced more by their date of birth or by their exposure, experience, and proficiency with emerging technologies. If the characteristics of a digital native are determined by age, then older generations are marginalized, resulting in an irreparable "digital divide" between the elderly and younger individuals. However, if digital proficiency is shaped by exposure and experience, then contexts in which younger and older generations engage may promote collaboration and learning (Helsper & van Deursen, 2017). Digital natives are defined by their exposure to and familiarity with technology; thus, the knowledge and skill gap between older and younger individuals may diminish as the former enhance their technological proficiency. Van Deursen and van Dijk (2015) found that, alongside gender, education, and technological experience, the extent of an individual's engagement in a digital environment—characterized by the variety of online activities—may be the most critical factor in elucidating the behaviors of digital natives. The findings support the notion that although digital natives have embraced various technologies, there is significant diversity in their behavioral adoption. The debate regarding digital natives revolves around two primary assertions: (1) the existence of a distinct generation of "digital natives," and (2) the necessity for education to fundamentally adjust to meet the needs of this demographic. Such claims are frequently examined in research that depends on basic assumptions lacking substantial empirical and theoretical backing.

Numbers of research has been done to attempt to determine who exactly constitutes a digital native. In the investigations, factors that are associated with digital natives, such as access to technology, age, experience, and digital literacy level, were included (Ng, 2012; Teo, 2013; Thompson, 2013). The digital gap has also been a primary subject of multidisciplinary research, examining aspects such as access, usage, and digital literacy; yet, the literature indicates considerable inconsistencies in conclusions due to the intricate, dynamic, and multifaceted character of the issue. Recent research has classified the digital divide into three specific categories: the access gap, the usage divide, and the performance or results divide related to ICTs (Helsper et al., 2015; Alexander et al., 2015; Lutz, 2019; Gladkova & Ragnedda, 2020).

According to Ng's (2012) findings from a study that investigated the degrees of digital literacy and digital nativity of pre-service teachers, digital natives were able to readily adjust to unfamiliar technologies that they met in the learning processes. According to the findings of this study, one must be comfortable with digital technology

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to be considered a digital native. It has been noted that recent research has attempted to explain digital nativity through indirect characteristics such as age and the amount of technology used (Teo et al., 2014).

The Digital Native Assessment Scale (DNAS) is an instrument that was designed by Teo and has been used to determine the degree to which an individual has acquired the skills of a digital native (Teo, 2013). The DNAS contains 21 questions, each with a 7-point Likert scale. Existing measures of digital nativity, such as those that are primarily intended to collect data relating to the type of technology utilized, the frequency with which technology is used, and the settings in which technology is used, are complemented by the DNAS. This instrument assesses how much people have grown up with technology (GrowT), are adept at multitasking (MultiT), rely heavily on visuals when communicating (GraphicC), and favor immediate feedback and reinforcement (InstantGR).

A person who has grown up with technology and naturally speaks the "language" of technology is an example of what Prensky means when he refers to people as digital natives (Teo, 2016). The digital native is adept at and even prefers, switching between multiple tasks at once, especially those that include media (Teo, 2016). The concept that the digital native possesses superior visual-spatial skills and is an intuitive visual communicator who uses images, texts, and sound to enhance communication is equivalent to the reliance on graphics for communication (Teo, 2016). Because of improvements in connectivity brought about by modern technology, people now have a higher standard for receiving communications and feedback in real-time, and as a result, they are more likely to thrive on quick gratification and incentives (Teo, 2016). Assessing an individual's digital competencies using instruments such as the Digital Natives Assessment Scale (DNAS) is crucial for multiple reasons. In our progressively digitalized culture, individuals' proficiency in digital skills and competences is essential for active engagement in diverse domains such as education, job, and social interaction. Evaluating these skills enables focused interventions and assistance to improve digital literacy and proficiency, guaranteeing that individuals are sufficiently prepared for the requirements of the digital era. Furthermore, evaluating the digital competencies of teachers is crucial for the successful incorporation of technology in the field of education. Teachers have a crucial role in enabling students' digital learning experiences, and their own digital skills directly affect the quality of education and student involvement in the classroom. Educational institutions can evaluate teachers' digital competencies to pinpoint areas requiring professional growth and offer specialized training to enable educators to successfully utilize technology for instruction and learning.

Several studies (Teo:2014, Coklar: 2016, Akcayr: 2015) provided empirical evidence to validate the DNAS as a self-report measure that was designed to describe and identify digital natives of the research samples. These studies validated the DNAS as a self-report measure. In the investigations, DNAS was utilized to measure the digital nativity of the participants, which was characterized by the four traits that are characteristic of DNAS. The findings suggested that the four-factor theoretical model that underpins the DNAS has some degree of validity when applied to different cultures. When applied to data from three distinct populations—Chinese, Turkish, and French—the model structure and DNAS instrument examined by Teo (2013) were determined to be a satisfactory fit. Two validation trials with student populations in Turkey supported the use of the DNAS instrument and model (Teo, 2016; Teo et al., 2016). Teo et al. (2016) did find an acceptable match for all the statistics, which they validated with pre-service instructors; nevertheless, it is important to note that in every case, the findings were only slightly better than expected. Wagner and Acier (2017) examined the DNAS with a sample of French college students and found that it was valid and met established statistical requirements. An interesting contrasting finding was found in the Chinese population. Huang et al. (2019) looked into DNAS data models used with university teachers ranging in age from 23 to 59 in China. The DNAS model was found to provide a good fit to the data once it was analyzed (Huang et al., 2019). Following these findings, digital native traits were displayed by participants who were not in the typical age range for the digital native. Hence, raising questions about the notions of digital natives. So, as a result of the incongruity in the conclusions of these earlier studies regarding who qualifies as a digital native, it is required to perform further evaluation of the DNAS with more populations at different research sites.

This current study tried to fill in the gap by examining 78 Indonesian teachers' responses to DNAS to contribute to the ongoing dispute regarding the validity of the DNAS, which Wilson (2020) had previously reported in the current literature. Wilson's study adds data from 178 participants in three teacher preparation programs in the United States to the DNAS validation discussion. The results of a confirmatory factor analysis of the study revealed that the data do not fit Teo's verified 21-item, 4-factor model nor a proposed 30-item, 4-factor model. Further analysis revealed that the DNAS may not address digital native factors. The discourse contributes to the ongoing and expanding critique of the structure. Therefore, as Wilson suggested that future research in educational technology and beyond should concentrate on alternate conceptualizations of modern students and teachers, this current study aims to explore Indonesian teachers' responses to DNAS. The significance of this study resides in its objective to examine the perspectives and engagements of Indonesian teachers with the Digital Natives Assessment Scale (DNAS), thus necessitating a reassessment of the theoretical construct of digital nativeness in the distinctive educational and cultural context of Asian, specifically Indonesian. Through its specific emphasis, this research endeavors to fill a vital knowledge void regarding the manifestation and interpretation of the notion of digital natives within culturally diverse environments. In doing so, it makes a valuable contribution to the development of educational strategies that are more culturally sensitive and efficacious.

2. METHOD

This study utilized an explanatory sequential mixed methods research design (Ivankova et al., 2006; Ivankova, 2021), which included an initial quantitative survey succeeded by a qualitative interview, placing particular emphasis on the quantitative aspect. The qualitative results offered a more nuanced understanding of both the significant and non-significant quantitative findings, aiding in the clarification of the conclusions derived from the

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initial survey. The concept of "mixed methods" includes a variety of approaches and practices. This involves a systematic approach to gathering and interpreting both qualitative and quantitative information, integrating these methods throughout various phases, starting from foundational philosophical beliefs to the concluding analysis of the data. The main reason for employing mixed methods is the conviction that combining qualitative and quantitative strategies can provide a more thorough insight into research problems (Creswell & Plano Clark, 2021; Johnson & Onwuegbuzie, 2019).

The explanatory sequential design stands out as one of the most frequently employed approaches in mixed methods research. The process initiates with the gathering of quantitative data, subsequently leading to the collection of qualitative data, with both stages being interconnected. This design is commonly employed when investigators aim to elucidate statistically significant or non-significant outcomes, or when they intend to categorize participants into subgroups based on quantitative results, subsequently conducting follow-up qualitative studies within each subgroup (Creswell & Plano Clark, 2021; Morse, 2020). This study employed an explanatory design, which was particularly fitting as the researchers sought to enhance their comprehension of the survey results through interviews. They needed to intentionally select interview participants based on the initial quantitative findings.

Participants and Research Site

Seventy-eight English teachers from fifteen secondary schools in Lampung, Indonesia, were asked to fill out the Digital Native Assessment Scale to identify digital native teachers (Teo, 2013). The identified teachers were working in secondary schools (both public and private) across six districts in Lampung.

As discussed earlier, Prensky (2001) defined digital natives as people who were born after 1980 and who have access to technology, possess technology skills, and feel comfortable using technology. The seventy-eight participants of the current study are categorized from their gender, birth year, educational qualification, teaching affiliation, and length of teaching experience. The majority of participants were identified as female (79.5 %, N=62), with fewer male participants (20.5%, N=16). Teachers who were born before the 1980s (41.1%, N=32) were fewer than those born after the 1980s (58.9%, N=46). Most of them gained their bachelor's degree (83.3%, N= 65), while the rest possessed master's degrees (16.7%, N=13). Regarding teaching affiliation, most of them belong to public schools (88.5%, N=69), and only some belong to private schools (11.5%, N=9). Most teachers have experienced teaching for over 10 years (67.9%, N=53). Some of them have 6-10 years of teaching experience (16.7%, N=13), and 2-5 years of teaching experience (11.5%, N=9). Few of them have experienced not more than 2 years of teaching (3.9%, N=3).

Of the seventy-eight participants who responded to the survey, two of them were purposively invited for a semi-structured interview. An in-depth interview was carried out with these two teachers who were both born before the 1980s. T1 is identified as a teacher who possesses a bachelor's degree and teaches in a rural school, while T2 possesses a master's degree and teaches in an urban school.

Research Procedure

Quantitative Phase

The Digital Native Assessment Scale was developed by Teo (2013) for the purpose of determining a person's level of digital nativity (DNAS). The purpose of this poll was to determine whether or not the teachers belong to the category of "digital natives." The survey is designed with a Likert scale that ranges from "strongly agree" (with a scale of 7) to "strongly disagree" (with a scale of 1), and its purpose is to determine the degree to which teachers: (1) grow up with technology (GrowT); (2) are comfortable with multitasking (MultiT); (3) rely on graphics for communication (GraphicC); and (4) thrive on instant gratifications and rewards (InstantGR). In the current research, the DNAS was administered online to 78 respondents. The instruments were sent to the respondents with an introduction requesting their informed consent to teachers' online communities from the first author's personal professional network. The result of the survey is used to identify the digital native characteristics of the respondents. The score of the DNAS represented the degree of the respondent's perceptions of the four attributes in the DNAS. The most significant score of each DNAS attribute gathered from the survey served as the initial quantitative for the quantitative phase of the study.

Qualitative Phase

The researchers purposefully selected participants for the interview to gain a deeper understanding of the survey results. Of the seventy-eight respondents, two of them were invited to participate in an in-depth interview. Four questions were delivered based on the initial quantitative data represented by the most significant score of the DNAS attributes. The interview results were used to confirm their agreement and disagreement with the most significant attribute of DNAS. Two questions were delivered to elicit their perceptions of digital native identification and conceptions.

3. RESULTS AND DISCUSSION

From the quantitative phase, it was revealed that statistically the respondents of this current study are characterized as digital natives. Teachers' digital native degree under the attribute of GrowT is 5.41, under the attribute of MultiT is 5.07, under the attribute of GraphicC is 5.53, and under the attribute of InstantGR is 4.82. The average score is 5.21, indicating a quite high level viewed by the scale range of 1 (low) to seven (high). The finding shows that the respondents of this study reach a level of being a digital native (Teo, 2015), and the respondents are therefore considered to be digital native teachers.

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This study is aimed to explore Indonesian teachers' responses to DNAS to revisit the conceptualization of digital natives. Therefore, the data taken from the teachers' responses were tabulated to identify the most claimed statements under the four DNAS attributes.

Teachers' Responses under the attribute of GrowT

It was revealed from the study that under the first attribute of "grow up with technology" (GrowT), most teachers claimed that they used the internet every day. The statements regarding the first DNAS attribute are presented in Chart 1.

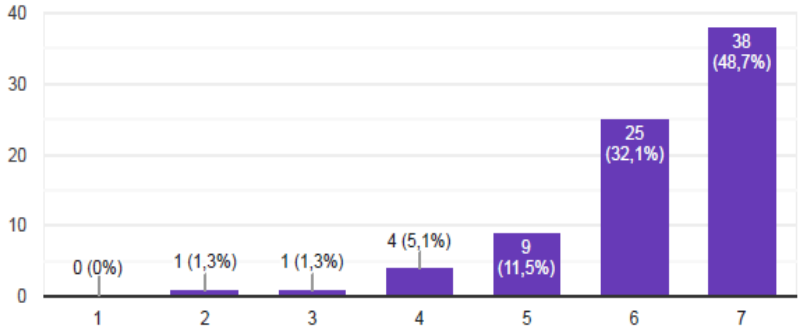

Fig 1. Most Claimed statement of GrowT

Most of the respondents, thirty-eight teachers (48.7%), strongly agree (scale of 7) with the statement "I use the internet every day", and twenty-five teachers (32.1%) agree (scale of 6) with the statement. The statistics on a scale of 6-7 indicate that most teachers are familiar with the internet in their daily activities. Respondents' familiarity with the internet as a part of technology is confirmed by the data taken from the interviews with two selected teachers. The first and the second interviewee agreed with the statements.

I agree with this statement. Nowadays, we cannot live without the internet. Everything is connected to it. (T1, T2)

I use the internet more for leisure activities. (T1)

I use the internet more for my jobs. (T2)

Referring to the function of DNAS in determining the level of digital nativity, the respondents' familiarity with the internet described in the chart, statistically validated the DNAS instrument. This validation also seemed to be supported by the teachers' statement in the interview about the most claimed statement under the attribute of GrowT. The assumption that one is a digital native only based on their level of experience with the use of the internet appears to be correct. However, the concept that the "native" is fundamentally natural to the use of technology has come under heavy criticism in recent years (Bennett & Maton, 2010; Littlejohn et al., 2012; Yong et al., 2016). Therefore, a person's 'familiarity' with the Internet seems too natural to serve as a defining characteristic of digital natives.

In this context, internet literacy provides a broader assessment of digital proficiency. Researchers characterize internet literacy as the capability to access, assess, and produce digital content (Livingstone, 2020). The access encompasses not just the ownership of devices, but also the necessary skills and knowledge required for effective usage. The ability to assess and analyze the extensive digital information available is essential, and producing valuable content necessitates a strong command of technical skills in the digital environment.

Bennett et al. (2010) argue that the capabilities of digital media require users to handle the technological elements of the medium and process information to generate content; therefore, the production skill is interconnected with the other two aspects. A comprehensive perspective on internet literacy indicates that evaluating a teacher's digital skills solely through their online experience is inadequate. The concept of "digital native" should not be reduced to simply being at ease with technology, as this fails to recognize the essential role of internet literacy. Internet literacy ought to be regarded as a fundamental component in assessing digital nativity and may act as a credible criterion for establishing whether an individual genuinely meets the definition of a digital native.

The conversation about digital natives does not align with empirical evidence, as young individuals exhibit a diverse array of attitudes and behaviors regarding technology. Although adults can assist youth in navigating digital spaces, the idea of the digital native simplifies the intricate dynamics between young individuals and technology. This method provides restricted understanding of successful educational strategies and may perpetuate current social disparities, underscoring the necessity to reshape the conversation and implement evidence-based approaches to more effectively assist young individuals in their educational journeys and beyond (Eynon, 2020).

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Teachers' responses under the attribute of MultiT

Under the second attribute of "comfortable with multitasking (MultiT)", most teachers claimed that they are able to use more than one application on the computer at the same time. Their responses are shown in chart 2.

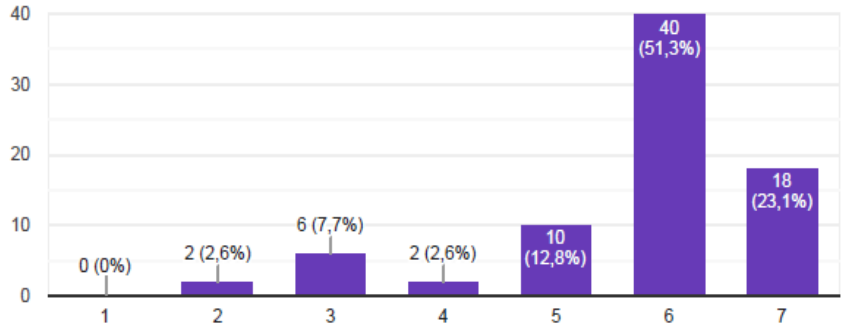

Fig 2. Most Claimed statement of MultiT

The majority of the respondents, forty teachers (51.3%), agree (scale of 6) with the statement "I am able to use more than one application on the computer at the same time", and eighteen teachers (23.1%) strongly agree (scale of 7) with the statement. It is pretty intriguing to find out that their preferences gravitate to "agree" rather than "strongly agree," despite the fact that the statement "being multitasking" received the largest percentage of positive responses. These responses appear consistent with the contradictory statements made by the two teachers in the interview.

For some works, I do. I am good at doing many things at one time, multitasking, but not quite much when it deals with technology. (T1)

I am multitasking. My working environment requires me to be good at handling things together. We are exposed a lot to digital technology. (T2)

As new technologies emerge at a rapid clip, so does the degree to which individuals multitask (Lyubova, 2021). T2, who was growing up in an environment where digital technology was rapidly expanding, quickly came to identify as a multitasker. T2's claims indicate a connection between effective job performance and effective multitasking. Since multitasking specifies that it involves simultaneous tasks serving distinct or unrelated goals, distinguishing it from behaviors where multiple tasks or modalities are coordinated to achieve related goals (Xu et al., 2019), teachers are required to engage in a high volume of task switching and multiple stimuli on a daily basis in the classroom. T1 was able to describe herself as a multitasker in reference to this particular concept of multitasking; yet, she was unable to identify herself as multitasking in regard to the ITC integration. T1 is not multitasking in the sense that the term refers to the use of technology to perform multiple tasks at once.

Computer-based multitasking, technical multitasking, mobile multitasking, and digital multitasking are all phrases used to describe this phenomenon, which is closely related to (and can depend on the research of) habits like media multitasking and multi-communicating (Twyman et al., 2020). Multiple interpretations of the term "multitasking" may account for the discrepancies in the survey and the interview results. T1's differing perspectives on multitasking seem to respond to the increased options on 'agree' in computer-based multitasking by the second attribute of DNAS. It's worth noting that a person's ability to multitask is influenced by a wide range of personal factors (Twyman et al., 2020), and that there is a correlation between a person's age and the frequency with which they use a given kind of media (van der Goot & Beentjes, 2008). Both T1 and T2 were classified by DNAS as multitaskers, however, in reality, the two teachers so-called digital natives cannot multitask in the manner that they have been portrayed to do (Kirschner & De Bruyckere, 2017). This finding contributes to another counter-position to the agreement about the identification of digital natives.

Teachers' responses under the attribute of GraphicC

Most teachers drop their choice on 'I use pictures more than words when I wish to explain something' for the most claimed statement under the third DNAS attribute 'rely on graphics for communication (GraphicC)'. Their statements are presented in chart 3.

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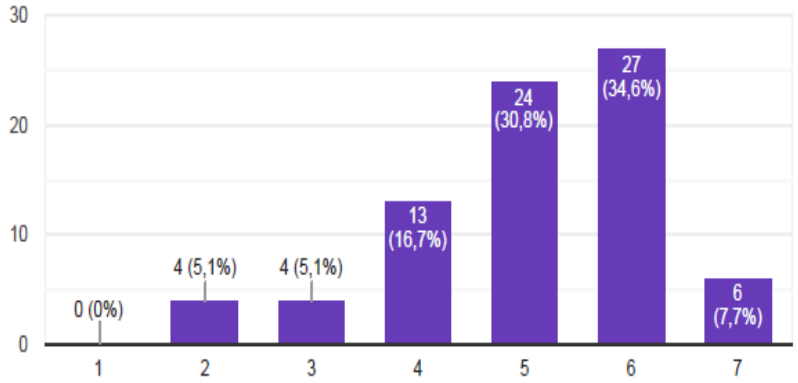

Fig 3. Most Claimed Statement of GraphicC

Twenty-seven teachers (34.6%) stated that they agree (scale of 6) with the statement "I use pictures more than words when I wish to explain something", and six teachers (7.7%) strongly agree (scale of 7) with the statement. The two teachers who participated in the interview provided support for the data that was gathered from the chart with regard to the usage of pictures or images for communication and for classroom teaching. Their statements included examples of how they engaged with various pictures or pictures.

I like using pictures, graphics, and icons but I don't like receiving too many graphics, and icons. (T1)

I like both, sending and receiving things with images; emojis, graphics, and icons. It depends on the formality of the message. I usually use pictures to help me explain the lesson. (T2)

The responses of the teachers to the DNAS demonstrated that their reliance on graphics for communication in this study underscored their reliance on images. These findings were supported by the statements that the teachers made during the interview. They regard visual aids, such as pictures or images, as universal learning stimuli that create a platform for students to begin sharing language in the classroom. They are of the opinion that pictures can be an effective approach to conveying abstract concepts or sets of data, encourage student interaction and discussion, and help develop students' abilities to read and absorb visual information (Hall, 2013). They are also aware that through the use of diverse formats including text, images, audio, and video, learners are prompted to examine, assess, and integrate information from a variety of viewpoints. This fosters their capacity for critical thinking. Diverse modes of expression enhance creativity, allowing students to discover novel approaches to articulate their ideas and engage in effective communication (Sutrisno et al., 2023).

Nonetheless, contemporary literacy in digital environments increasingly emphasizes the incorporation and analysis of visual media, indicating that digital literacy may depend more on image-centric communication rather than solely on conventional text (Anani et al., 2021). Considering this development, evaluating teachers' digital native status solely through their answers to conventional digital nativity assessments (DNAS) might not provide a comprehensive understanding. The third element of digital nativity, characterized by a preference for visual communication, warrants careful examination in relation to the unique requirements of teaching. As digital technologies increasingly shape the educational landscape, the dependence on visual and interactive tools has emerged as an essential component of effective teaching. The extent to which educators incorporate visuals in their communication appears to be shaped more by their professional environments than solely by their generational comfort with digital technologies (Pateşan et al., 2018).

As Hall (2013) pointed out, the utilization of visual aids in the classroom is a pedagogical method that is intended to engage students who have grown up in an environment that is rich in various forms of media. In the context of teachers, and in light of the comments provided by teachers during the interview, it can be said that the use of pictures is more prevalent for the purpose of teaching than for communicating. This conclusion begs the question: to what extent does the use of pictures by teachers genuinely reflect their digital nativeness?

Teachers' responses under the attribute of InstantGR

Under the fourth attribute of "thrive on instant gratifications and rewards" (InstantGR), most teachers claimed that they prefer to learn those that can be used quickly first. The statements are presented in Chart 4.

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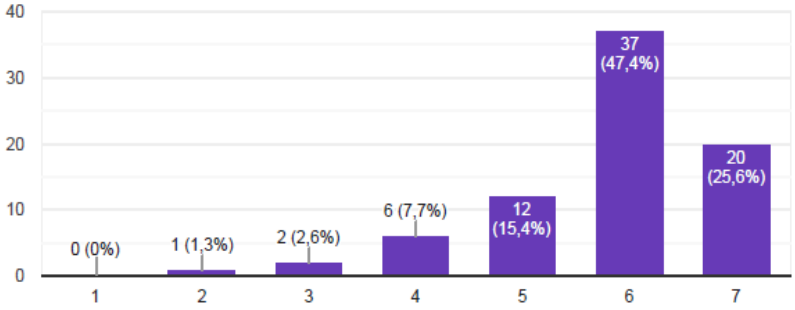

Fig 4. Most Claimed statement of InstantGR

In the statement "when I study, I prefer to learn those that I can use quickly first", thirty-seven teachers (47.4%) agree (scale of 6), and twenty teachers (25.6%) strongly agree (scale of 7) with the statement.
Instant gratification is coined with the fourth attribute of this digital native instrument validation (DNAS). Teachers' responses to DNAS highlighted the statements in the interview.

Everything happens instantly. I prefer to get things done in a quick way. (T1)

Me too. The faster the better. I always have many things to do at school, so I need to get my jobs done efficiently. I need to be supported with instant access to technology. (T2)

According to the findings of this research, teachers are considered to be purposeful, active participants who choose media based on their own social and psychological requirements. They take an active role in choosing media resources, tailoring their selections to meet students' individual social, psychological, and pedagogical requirements. Research has demonstrated that in order to pick media effectively, teachers must first identify and accommodate students' individual learning styles (Castro, 2022). According to research, one of the main reasons why instructors prefer using digital media in the classroom is the immediate satisfaction it brings them (Alomari et al., 2020). Researchers have shown that educators are looking for ways to fulfill their demands for easy communication and quick access in the digital world, expanding on the Uses and Gratifications hypothesis (Katz, Blumler, & Gurevitch, 1974). Teachers are highly motivated by the fast access given by digital technology. They find that these tools help them engage with pupils more successfully and respond swiftly to instructional demands (Lohr et al., 2024). As a result, the significance of digital technology tools in modern education is reinforced by the fact that teachers continue to utilize them due to the convenience and quick access they provide.

It has been hypothesized that individuals are motivated to use particular forms of communication by the enjoyment they perceive when using such forms of communication (Gan & Li, 2018) and by the information-sharing gratification they get from their communication. The statement that T2 made about her pedagogical challenges reveals her preference for having rapid access to technology, demonstrates her favorable attitude toward digital technology, and empirically characterizes her identity as a digital native (Howlett & Waemusa, 2018) in the context of instant gratification.

Teachers' Views of Digital Native and Digital Immigrant Conception

For the purpose of validating teachers' digital native status, two questions were posed to teachers during the interview. Teachers were asked to identify whether they fall under the category of digital immigrant or digital native. In addition, they were asked for their interpretations of the term "digital native." Although the DNAS poll confirms that the two teachers are digital natives, their divergent responses to the first question provide a novel viewpoint on the study of digital native conception.

I think I can say that in some contexts, I belong to a digital native, but overall, I like to position myself as a digital immigrant because I still have problems dealing with something new about digital technology. (T1)

I belong to the digital native. My working conditions shape my digital nativity. (T2)

Certain advocates of the "digital native" or "net generation" idea contend that individuals across all age groups can attain proficiency in diverse technologies, albeit through varying processes. Tapscott's early work (1998) suggested that younger individuals, nurtured in a technology-driven environment, develop technological skills more organically, frequently through an assimilative process. In contrast, older individuals, having experienced the swift advancement of technology, encounter a more supportive approach to acquiring new skills, which can present greater challenges. Recent studies indicate that although older generations may have encountered more significant learning challenges in the past, they are now frequently just as skilled in information and communication technologies (ICTs), effectively closing the proficiency gap with younger generations (Helsper & Eynon, 2010; Álvarez-Dardet, 2020). This is corroborated by educators from before the 1980s, who conveyed comparable feelings, demonstrating their successful adaptation to contemporary digital requirements.

The perspectives of educators regarding the concept of digital natives also mirror current discussions. The concept of a "native" user, who is seamlessly skilled with digital tools, has been subject to considerable critique

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(Kirschner & De Bruyckere, 2017; Pangrazio & Green, 2021). The findings indicate that digital skills are not innate but rather developed, with significant variations in proficiency observed across different age demographics. The responses from educators indicate a recognition of this viewpoint, alongside a continued adherence to conventional beliefs regarding digital natives.

A digital native is someone who is able to do any kind of job regarding digital technology. I am not quite exposed to digital things. If you want to be a digital native, you need to get lots of exposure. (T1)

A digital native is someone who is able to utilize technology to help him/her with daily activities. I don't think that digital natives should be those who were born after the 1980s. Your familiarity with digital technology does not count on your birth year. (T2)

Interview responses from the teachers lent credence to the argument that a person's birth year is not a reliable predictor of their degree of digital nativeness. Becoming a digital native can be achieved in a variety of ways, including but not limited to chronological age, depth of use and experience, gender, race, socioeconomic status, and level of education (Junco, Merson, & Salter, 2010), and general competence with regard to technology (Hargittai, 2010; Helsper & Eynon, 2010).

It would appear that these remarks lend credence to the claim that it might not be fully fruitful to classify digital natives and immigrants as separate generations. Although people of different generations use technology in different ways, there are also similarities between generations that are influenced by how much experience people have with different tech tools and platforms. This perspective aligns with findings that emphasize the role of personal experience over generational labels in determining digital literacy and engagement patterns (Kirschner & De Bruyckere, 2017; Helsper & van Deursen, 2017).

In the context of teachers and their teaching, students' varied technological interests and abilities cast doubt on the idea of a "digital native" generation that is fluent in all things digital. Contrary to popular belief, these preferences and abilities do not often dictate significant shifts in teaching methods or student requirements (Kirschner & De Bruyckere, 2017). Consequently, despite the fact that words like "digital natives" and "Net generation" may still ring true in popular views of youth and technology, they do not provide any instructional benefit (Manca, 2020).

In light of these findings, it becomes evident that digital nativeness encompasses far more than mere familiarity with technology; it extends into a nuanced understanding and skill set that includes the ability to navigate, assess, and responsibly leverage digital tools and resources. This broader concept of digital skills, as highlighted, is not limited to device manipulation but includes critical problem-solving, effective communication, and awareness of digital safety (Korpela et al., 2024). The COVID-19 pandemic further underscored the necessity of these competencies, as individuals depended on digital solutions during times of limited physical mobility and social isolation (Banskota et al., 2020). By revisiting the concept of digital nativeness through the perspectives of teachers, this study sheds light on the evolving digital skills needed within educational contexts. These insights can help to refine the approach to teaching digital literacy, ensuring that educators and students alike are equipped to thrive in a digitally connected environment.

4. CONCLUSION

This study contributes to the ongoing dispute regarding the validity of the DNAS, which Wilson had previously reported in the literature. Using the data taken from seventy-eight Indonesian secondary school teachers who responded to the survey, it was revealed that from the quantitative investigation, the teachers are categorized as digital natives by the DNAS. Most claimed statements of the DNAS attributes were contrasted by the teachers' responses in the qualitative phase through semi-structured interviews. The results of the survey and the semi-structured interviews provided the data for the examination of how the DNAS addresses the factors that contribute to digital nativeness from the most claimed DNAS attributes analysis. The results from the DNAS corroborated Wilson's claim that the DNAS may not address the features of digital natives. This study recommends that future research in the realm of educational technology and beyond should concentrate on different ways of conceiving the concept of digital natives. Since this study is limited to the most claimed statements of the DNAS attribute, further studies should investigate the other attributes for more rigorous analysis to contribute to the growing study on digital natives' conceptualization.

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6. REFERENCES

Akçayır, M., Hakan Dündar, Go€kçe Akçayır. (2015). What makes you a digital native? Is it enough to be born after 1980? Computers in Human Behavior. http://dx.doi.org/10.1016/j.chb.2016.02.089

Alexander, J.A., van Deursen, A.J. and Helsper, E.J. (2015). "The third-level digital divide: who benefits most from being online?", Communication and Information Technologies Annual, Vol. 10, pp. 29-52.

Alomari, I., Al-Samarraie, H., & Yousef, R. (2020). The role of gamification techniques in promoting student learning: A review and synthesis. Journal of Educational Technology & Society, 23 (3), 95–107.
Álvarez-Dardet, Menéndez., Susana & Lorence, Bárbara & Padilla, Javier. (2020). Older adults and ICT adoption: Analysis of the use and attitudes toward computers in elderly Spanish people. Computers in Human Behavior. 110. 106377. 10.1016/j.chb.2020.106377.
Anani, Gifty & Lamptey, Dr & Frempong, Clara. (2021). Redefining Literacy in a Digital Age: The Role of Instructors in Promoting Digital Literacy. Journal of English Language Teaching and Applied Linguistics. DOI: 10.32996/jeltal
Banskota, S., Healy, M., & Goldberg, E. M. (2020). 15 smartphone apps for older adults to use while in isolationduring the COVID-19 pandemic. Western Journal of Emergency Medicine, 21(3), 514–525. https://doi.org/10.5811/westjem.2020.4.47372
Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. British Journal of Educational Technology, 39(5), 775–786. https://doi.org/10.1111/j.1467-8535.2007.00793.x
Bennett, S., & Maton, K. (2010). Beyond the 'digital natives' debate: Towards a more nuanced understanding of students' technology experiences. Journal of Computer Assisted Learning, 26(5), 321–331
Castro, A. (2022). Proof of Concept Teaching for 21st Century Digital Literacy in Portugal: A Pedagogical Approach Towards a New Educational Model. IFIP Advances in Information and Communication Technology, pp. 168-178. doi: 10.1007/978-3-030-97986-7_14
Çoklar, Ahmet & Dulkadir Yaman, Nihal & Kabakci, Isil. (2016). Information literacy and digital nativity as determinants of online information search strategies. Computers in Human Behavior. 70. 10.1016/j.chb.2016.12.050.
Creswell, J. W., & Plano Clark, V. L. (2021). Designing and conducting mixed methods research (4th ed.). Sage Publications.
Eynon, Rebecca (2020), "The myth of the digital native: Why it persists and the harm it inflicts", in Tracey Burns and Francesca Gottschalk (eds.), Education in the Digital Age: Healthy and Happy Children, OECD Publishing, Paris. DOI: https://doi.org/10.1787/2dac420b-en.
Gallardo-Echenique, E. E., de Oliveira, J. M., Marqués-Molias, L., & Esteve-Mon, F. (2017). Digital competence in the knowledge society. Merlot Journal of Online Learning and Teaching, 13(2), 1-16.
Gladkova, A. and Ragnedda, M. (2020), "Exploring digital inequalities in Russia: an interregional comparative analysis", Online Information Review, Vol. 44 No. 4, pp. 767-786.
Greenhow, C., & Lewin, C. (2018). Social media and education: Reconceptualizing the boundaries of formal and informal learning. Learning, Media and Technology, 43(1), 6-30.
Gan, C., & Li, H. (2018). Understanding the effects of gratifications on the continuance intention to use WeChat in China: A perspective on uses and gratifications. Computers in Human Behavior, 78, 306–315. doi: 10.1016/j.chb.2017.10.003
Hämäläinen, R., & Cattaneo, A. (2019). New TEL environments for vocational education – Teacher's instructional perspective. British Journal of Educational Technology, 50(3), 1163-1178. doi:10.1111/bjet.12707
Hall, Macie. (2013). Teaching with Images. The Innovative Instructor Blog. Retrieved from https://ii.library.jhu.edu/2013/04/19/teaching-with-images/
Hargittai, E. (2010). Digital Na(t)ives? Variation in internet skills and uses among members of the "net generation.". Sociological Inquiry, 80(1),92–113. https://doi.org/10.1111/j.1475-682X.2009. 00317.x
Helsper, Ellen Johanna and Rebecca Eynon. (2010). Digital natives: where is the evidence? British Educational Research Journal Vol. 36, No. 3, June 2010, pp. 503–520.
Helsper, E.J., van Deursen, A.J. and Eynon, R. (2015), Tangible Outcomes of Internet Use. From Digital Skills to Tangible Outcomes Project Report, Oxford Internet Institute, Oxford.
Helsper, Ellen & Deursen, Alexander J.A.M. (2017). Do the rich get digitally richer? Quantity and quality of support for digital engagement. Information, Communication & Society. 20. 700-714. 10.1080/1369118X.2016.1203454.
Howlett, G., & Waemusa, Z. (2018). Digital native/digital immigrant divide: EFL teachers' mobile device experiences and practice. Contemporary Educational Technology, 9(4), 374–389. https://doi.org/10.30935/cet.471007
Huang, Fang., Timothy Teo, & Jinbo He. (2019). Digital nativity of university teachers in China: factor structure and measurement invariance of the Digital Native Assessment Scale (DNAS). Interactive Learning Environments. https://doi.org/10.1080/10494820.2019.1570278.
Huang, R. H., Liu, D. J., Tlili, A., Yang, J. F., & Wang, H. H. (2020). Handbook on facilitating flexible learning during educational disruption: The Chinese experience in maintaining undisrupted learning in COVID-19 Outbreak. Smart Learning Institute of Beijing Normal University UNESCO, 1–54. Retrieved from https://iite.unesco.org/news/ handbook-on-facilitating-flexible-learning-during-educational-disruption
Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice. Field Methods, 18(1), 3–20. https://doi.org/10.1177/ 1525822X05282260
Ivankova, N. V. (2021). Mixed methods applications in action research. Springer.
Johnson, R. B., & Onwuegbuzie, A. J. (2019). Mixed methods research: A research paradigm whose time has come. Educational Researcher, 33(7), 14-26.
Junco, R., Merson, D., & Salter, D. W. (2010). The effect of gender, ethnicity, and income on college students' use of communication technologies. Cyberpsychology, Behavior and Social Networking, 13(6), 619–627. https://doi.org/10.1089/cyber.2009.0357

Katz, E, Blumler, J. G., & Gurevitch, M. (1974). Utilization of mass communication by the individual. In J. G. Blumler & E. Katz (Eds.), The uses of mass communications: Current perspectives on gratifications research (pp. 19/32). Beverly Hills, CA: Sage

Kirschner, P. A., & De Bruyckere, P. (2017). The myths of the digital native and the multitasker. Teaching and Teacher Education, 67, 135–142. https://doi.org/10.1016/j.tate.2017.06.001

Korpela, V., Pajula, L., & Hänninen, R. (2024). Investigating the multifaceted role of warm experts in enhancing and hindering older adults' digital skills in Finland. International Journal of Lifelong Education, 43(5), 509–522. https://doi.org/10.1080/02601370.2024.2353176

Littlejohn, A., Beetham, H., & McGill, L. (2012). Learning at the digital frontier: a review of digital literacies in theory and practice. Journal of Computer Assisted Learning, 28(6), 547–556. https://doi.org/10.1111/j.1365-2729.2011.00474.x

Llorente-Barroso, C., Kolotouchkina, O., MañMañAs-Viniegra, L., & Viñarás-Abad, M. (2023). ICT-mediatedlearning as a form of socio-emotional support for older adults. Interaction Design and Architecture(s) Journal -IxD&a, 54(54), 8–33. https://doi.org/10.55612/s-5002-054-001.

Livingstone, S., & Blum-Ross, A. (2020). Children's digital literacy and digital inequalities. Routledge.

Lohr, Anne & Sailer, Michael & Stadler, Matthias & Fischer, Frank. (2024). Digital learning in schools: Which skills do teachers need, and who should bring their own devices? Teaching and Teacher Education. 152. 10.1016/j.tate.2024.104788.

Lutz, C. (2019), "Digital inequalities in the age of artificial intelligence and big data", Hum Behav and Emerg Tech, Vol. 1, pp. 141-148.

Lyubova, T. (2021). Digital multitasking problem in modern universities educational process. SHS Web of Conferences, 97, 01011. https://doi.org/10.1051/shsconf/20219701011

Manca, S. (2020). Snapping, pinning, liking or texting: Investigating social media in higher education beyond Facebook. The Internet and Higher Education, 44, 100707. https://doi.org/10.1016/j.iheduc.2019.100707.

Morse, J. M. (2020). Qualitative health research: Creating a new discipline. Routledge.

Ng, W. (2012). Can we teach digital natives digital literacy? Computers & Education, 59(3), 1065e1078.

Pangrazio, L., Sefton-Green, J. (2021). Digital Rights, Digital Citizenship and Digital Literacy: What's the Difference? J. New Approaches Educ. Res. 10, 15–27. https://doi.org/10.7821/naer.2021.1.616

Pateşan, Marioara & Balagiu, Alina & Alibec, Camelia. (2018). Visual Aids in Language Education. International conference KNOWLEDGE-BASED ORGANIZATION. 24. 356-361. 10.1515/kbo-2018-0115.

Prensky, M. (2001). Digital Native, Digital Immigrant Part 1. On the Horizon, 9(5), 2–6.

Prensky, M. (2009). H. Sapiens Digital: From Digital Immigrants and Digital Natives to Digital Wisdom. Innovate: Journal of Online Education, 5(3).

Setyaningsih, E., Wahyuni, D. S., Rochsantiningsih, D., (2020). Mapping Indonesian EFL Teachers' perception and practice of technology integration. International Journal of Education, 13(1), 44-52. doi: 10.17509/ije.v13i1.22643

Sutrisno, Djoko & Abidin, Noor & Pambudi, Nanda & Adyawati, Emilia & Sallu, Sulfikar. (2023). Exploring the Benefits of Multimodal Literacy in English Teaching: Engaging Students Through Visual, Auditory, And Digital Modes. Global Synthesis in Education Journal. 01. 01-014. 10.61667/xh184f41.

Tapscott, D. (1998). Growing up digital: the rise of the net generation. New York, McGraw-Hill.

Taskiran, A., Koral Gumusoglu, E., & Aydin, B. (2018). Fostering Foreign Language learning with Twitter: Reflections from English learners. Turkish Online Journal of Distance Education, 19(1), 100–116. https://doi.org /10.17718/tojde.382734

Teo, Timothy. (2013). An initial development and validation of a Digital Natives Assessment Scale (DNAS). Computers and Education, 67, 51–57. https://doi.org/10.1016/j.compedu.2013.02.012

Teo, Timothy., Işıl Kabakçı Yurdakul & Ömer Faruk Ursavaş. (2014). Exploring the digital natives among pre-service teachers in Turkey: a cross-cultural validation of the Digital Native Assessment Scale. Interactive Learning Environments. http://dx.doi.org/10.1080/ 10494820.2014.980275

Teo, Timothy. (2015). Do digital natives differ by computer self-efficacy and experience? An empirical study. Interactive Learning Environments. DOI: 10.1080/10494820.2015. 1041408.

Teo, T. (2016). Do digital natives differ by computer self-efficacy and experience? An empirical study. Interactive Learning Environments, 24(7), 1725–1739.

Thompson, P. (2013). The digital natives as learners: Technology use patterns and approaches to learning. Computers & Education, 65, 12e33

Twyman, Nathan W., Jeffrey G. Proudfoot, Ann-Frances Cameron, Eric Case , Judee K. Burgoon & Douglas P. Twitchell. (2020) Too Busy to Be Manipulated: How Multitasking with Technology Improves Deception Detection in Collaborative Teamwork. Journal of Management Information Systems, 37:2, 377-395, DOI: 10.1080/07421222.2020.1759938

van der Goot, M., & Beentjes, J. W. J. (2008). Media use across the life-span. In W. Donsbach (Ed.), The International Encyclopedia of Communication. Oxford/Washington: Blackwell/ICA

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2015). Toward a Multifaceted Model of Internet Access for Understanding Digital Divides: An Empirical Investigation. The Information Society, 31(5), 379–391. https://doi.org/10.1080/01972243.2015.1069770

Wagner, V., & Acier, D. (2017). Factor structure evaluation of the French version of the Digital natives assessment scale. *Cyberpsychology, Behavior, and Social Networking,* 20(3), 195–201. https://doi.org/10.1089/cyber.2016.0438

DOI: https://doi.org/10.17509/ije.v17i2.62640
p- ISSN 1978-1342 e- ISSN 2442-4730

Wilson, Matthew L., Jacob A. Hall & David J. Mulder. (2020). Assessing digital nativeness in pre-service teachers: Analysis of the Digital Natives Assessment Scale and implications for practice. *Journal of Research on Technology in Education,* DOI: 10.1080/15391523.2020. 1846146

Xu, Shan., Zheng W, Kelsey W. (2019). Multitasking and Dual Motivational Systems: A Dynamic Longitudinal Study, Human Communication Research, Volume 45, Issue 4, Pages 371–394, https://doi.org/10.1093/hcr/hqz009

Yong, S. T., Gates, P., & Harrison, I. (2016). Digital native students – Where is the evidence? *The Online Journal of New Horizons in Education,* 6(1), 46–58.

DOI: https://doi.org/10.17509/ije.v17i2.62640
p- ISSN 1978-1342 e- ISSN 2442-4730