



Digital Natives Preferences in How to Learn Mathematics: A Qualitative Study of Preservice Mathematics Teachers

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ABSTRACT

The purpose of this study was to describe how digital natives as preservice mathematics teachers learn mathematics. The research subjects were 30 students of the Mathematics Education Study Program at the Universitas Negeri Gorontalo. This research is a descriptive qualitative research with data collection techniques are semistructured interview, questionnaire using Mentimeter, and documentation. Data collecting held in 2022. First, they were interviewed to obtain information on how they studied college mathematics courses such as calculus or differential equations. After obtaining the methods they used, they were then asked to fill out a questionnaire via Mentimeter. From the results of the interviews and filling out the questionnaire, it was found that their ways of learning were by watching YouTube, reading books, discussing mathematics material with their peers, searching for learning material from the internet, and also using mathematical applications to help them solving problems. Although everyone has different preferences for which method they like the most, in general, they combine all five learning styles. When they were asked to choose the method they liked the most, 50% of them choose watching YouTube; 43% prefer to learn from books; and 6.67% choose to use mathematical application. The mathematical applications they use are dominated by Photomath. Other applications used are Qanda, Brainly, Colearn, Mathway, MathLab, Mathenchanter, Geogebra, Snap Quiz, and Wolfram Alpha. The results show that book is still relevant to use in this digital age.

Keywords: Digital Natives; Learning Mathematics; Mathematics Solver Application.

1. Introduction

The development of science and technology has gradually changed human life, including the way we learn. Today's students are not the same as students in the past, they were born in an era where digital technology and the internet are inseparable

from human life [1]. Our students have moved into the information age. Before digital technology developed rapidly, students only depended on books, teacher explanations, or classroom learning. They learn through books, looking for answers from books. Meanwhile, today's students don't have to search for words in books, they can all be easily found on Google. Video lessons and explanations about a material can also be easily found on YouTube. Students in this digital era have unlimited learning opportunities outside the classroom. In this information age, schools and classrooms which based on classroom-speaking teachers, textbooks, rote memorization, and content-based testing, are becoming increasingly out of sync with the world around them [2]. Today's students are no longer the people our educational system was originally designed. [1][2][3].

The term that can be used to call students nowadays is digital natives. The term "digital natives" was originally initiated by Prensky in 2001. Prensky described students today are all "native speakers" of the digital language of computers, video games and the Internet [3]. They have grown up surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age [3].

The accelerated development of technology also affects mathematics learning. The result of rapid changes in information technologies and technological revolution in mathematics teaching and methods are represented by modern teaching methods beginning with the scientific calculator, through video teaching topos, and some other electronic equipment to the computer, and multimedia and programs [4]. Currently, there are a lot of application that can solve mathematics problem only by capturing the problem using smartphone camera. Students can easily solve integration problem and many other problems by using smartphone application. Video of mathematics material also can easily access in YouTube.

On the other hand, nowadays, there are still many mathematics class that use conventional methods, teacher-centered learning [5][6][7]. Besides, mathematics learning material in the school curriculum in Indonesia is also not very different from the past, which seems irrelevant to current technological developments. As an analogy, in history lessons, for example, memorizing the date of a historical event is no longer so important because everything can be easily searched on Google. History lessons that emphasize memorizing dates of events, for example, are no longer relevant to being taught to digital natives. Likewise in mathematics, there have been many sophisticated math solver and calculator applications. It is no longer relevant if learning mathematics is dominated by the practice of counting. This time is a crossroads where curricula and methods of teaching mathematics need to be redesigned.

In response to the current development, Indonesia's Ministry of Education has developed a new curriculum that gives educators the freedom to create quality learning that fits the needs and learning environment of their students. The curriculum has started to be implemented, but in its implementation there are still many shortcomings and obstacles [8]. There are lacks of implementation guidelines and relies heavily on the teacher's ability and willingness to improve mathematics learning.

The role of the latest curriculum is to emphasize learning designed based on the needs of students and the learning environment, so it is very important to know how

students learn. As said by Kinvunja, if we accept that our role as educators is to facilitate student learning, we must recognize that it is our duty to better understand how students learn [9]. By knowing how students learn, we can design the right learning method for them.

Recent research on the digital native's view of himself has been carried out. In a study at the university level, eight university students of the digital natives were interviewed about the connections they saw between technology use and learning, and also their reactions to the popular press claims about digital natives [10]. Other study examines the comparison of preferred learning styles between digital natives and digital immigrants as Malaysian Music and Museum visitors [11]. Several studies in Indonesia have focused on the effectiveness of a mathematics learning tools applied to digital native students [12][13]. There is still no research that focuses on exploring the preferences of how to learn mathematics of the digital native generation, especially digital natives as future mathematics teachers.

In order to know how digital natives learn mathematics in this era, this study explored how digital natives as preservice mathematics teacher described their preference way to learn mathematics material by addressing the following research questions:

1. How do research subjects learn mathematics?
2. What learning method they like the most?
3. If they use mathematics application solver, what mathematics application solver that they used to?

The answer of the research questions can be used to design mathematics learning method that is suitable for them (subject research). In general, the result of the study can be used as reference on how digital natives learn mathematics.

2. Method

This is descriptive qualitative research. The research subjects were 30 students of the Mathematics Education Study Program at the Universitas Negeri Gorontalo. The research conducted at 2022. Data collection techniques are (1) semistructured interview, (2) questionnaire using Mentimeter, and (3) documentation. First, they were interviewed to obtain information on how they studied college mathematics courses such as calculus or differential equations. After obtaining the methods they used, they were then asked to fill out a questionnaire via Mentimeter.

Qualitative data analysis in this study used Miles & Huberman's qualitative analysis which included three main steps, (1) data reduction, (2) data display and (3) conclusion drawing and verification [14]. Data reduction is used to select important data and remove things that don't need to be included in the research results. After the data is reduced, the data is then presented with a description of the words. Conclusions were drawn according to the results of interviews and questionare formulated to answer research questions.

Moleong's four validity criteria (Credibility, Transferability, Dependability, and Confirmability) were used in validating the data in this study [15]. A technique to confirm the credibility of the data in this study was by triangulation. The triangulation

in this study used technical triangulation. That is, we used different techniques to find data from the same source. In this case, it was interview and questionnaire. In this study, to meet the transferability test, the study results are written in standard language so that the reader can understand the results of this study. Dependability checks are done through audits of the entire research process. In this study, documentation techniques were applied to interview and questionnaire results to meet reliability tests. Confirmability test means testing research results related to a running process. In this study, the process was included in the results and findings and linked to existing theories in the discussion.

3. Result and Discussion

From the results of the interviews, it was found that their ways of learning were by watching YouTube, using books, peer teaching, searching for material from the internet, and also using mathematical applications. When they were asked to choose the method they liked the most, 50% of them choose watching YouTube; 43% prefer to learn from books; and 6.67% chose to use mathematical application. Although everyone has different preferences for which method they like the most, most all of them combine all five learning styles. The mathematical applications they use are dominated by Photomath. Other applications used are Qanda, Brainly, Colearn, Mathway, MathLab, Mathenchanter, Geogebra, Snap Quiz, and Wolfram Alpha.

Students who chose watching YouTube as the most favorite way to learn mathematics described several advantage learning using YouTube video. The advantage of learning mathematics through watching YouTube videos according to them is that they can get an explanation as the teacher explains with various advantages, including (1) video can be played repeatedly until they understand the material; (2) they can learn anytime and anywhere; (3) there are various choices of videos; (4) affordable; and (5) video explanations are more detailed than books.

In learning mathematics through YouTube, they have different ways of learning. Some students like to watch videos all the way through before trying to solve problems. Several others watched while taking notes and understanding. Most of them watch explanatory videos about concepts first, and some others prefer to go straight to problem-solving examples. From this description, it can be seen that YouTube can accommodate students' needs according to their individual learning styles. Digital natives' preference for using YouTube is consistent with various studies on the use of YouTube to support mathematics learning. A development research by Yudela *et al.* conclude that YouTube videos developed in their study are suitable for use by students [16]. Another study by Isnaini & Azhar found that YouTube is related to student learning independence and is one of the factors affecting student learning independence, especially in mathematics [17].

Those who choose books as their main source of learning state books are a complete and reliable source of learning. The concepts are arranged systematically and are equipped with practice questions. From this result, it can be seen that, even though digital technology has developed rapidly, books remain a source of learning mathematics that is never outdated. Books are still relevant for the digital native

generation, although of course books nowadays are not only limited to printed books. This in line with what Stole holds that book reading still has its place in education [18].

Beside watching YouTube video and reading text book, discussing material with their friends is their favourite learning style. This result in consistent with what Prensky state, digital natives are function best when networked, which means that learning is not just an individual activity, but a collective activity [3].

When they can't solve mathematics problem by watching video YouTube, reading books, asking friends, or search material on the internet, the mathematics application is what they use. Some student's directly choose to use Photomath. According to them, they can easily know solution of complex mathematics problem step by step from Photomath, and it helping them to learn. There are also many research show that Photomath had effect on mathematics learning [19][20].

4. Conclusion

The research subjects (who are digital natives) learn mathematics by watching YouTube, reading books, discussing mathematics material with their peers, searching for learning material from the internet, and also using mathematical applications to help solving problems. Although everyone has different preferences for which method they like the most, most all of them combine all five learning styles. The mathematical applications they use are dominated by Photomath. Other applications used are Qanda, Brainly, Colearn, Mathway, MathLab, Mathenchanter, Geogebra, Snap Quiz, and Wolfram Alpha. These results show that book is still relevant to use in this digital age.

Reference

- [1] Yong, S. and Gates P, "Born digital: Are they really digital natives," *International Journal of e-Education, e-Business, e-Management and e-Learning*, vol. 4, no. 2, pp. 102-105, 2014.
- [2] Kelly, F. S., McCain, T., and Jukes, I., *Teaching the digital generation: No more cookie-cutter high schools*, Corwin Press, 2008.
- [3] Prensky, M., "Digital natives, digital immigrants," *On The Horizon*, vol. 9, no. 5. pp. 3-6, 2001.
- [4] Hamadneh, I. M. and Masaeed, A.A., "Math teachers attitudes towards photo math application in solving mathematical problem using mobile camera," *Educational Research and Reviews*, vol. 10, no.14, pp. 1930-1936, 2015.
- [5] Harefa, D., et al., "Penerapan Model Pembelajaran Cooperative Script untuk Meningkatkan Hasil Belajar Matematika," *JKPM (Jurnal Kajian Pendidikan Matematika)*, vol. 6, no. 1, pp. 13-26, 2020.
- [6] Hignasari, L. V. and Supriadi, M., "Pengembangan e-learning dengan metode self assessment untuk meningkatkan hasil belajar matematika mahasiswa universitas Mahendradatta," *Jurnal Kependidikan: Jurnal Hasil*

Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran, vol. 6., no. 2., pp. 206-219, 2020.

- [7] Yusuf, M., "Peningkatkan Hasil Belajar Matematika Siswa melalui Lembar Kerja Siswa (LKS) Interaktif Berbasis Komputer di SMA Muhammadiyah 1 Palembang," *Jurnal Pendidikan Matematika*, vol. 4., no. 2, pp. 34-44, 2010.
- [8] Rahayu, R., et al., "Implementasi Kurikulum Merdeka Belajar di Sekolah Penggerak," *Jurnal Basicedu*, vol. 6, no. 4, pp. 6313-6319, 2022.
- [9] Kivunja, C., "Theoretical perspectives of how digital natives learn," *International Journal of Higher Education*, vol. 3, no.1, pp. 94-109, 2014.
- [10] Thompson, P., "How digital native learners describe themselves," *Education and Information Technologies*, vol. 20, pp. 467-484, 2015.
- [11] Aziz, A. et al., "Preferred Learning Styles for Digital Native and Digital Immigrant Visitors in the Malaysian Music Museum," *Asian Journal of University Education*, vol. 16, no. 3, pp. 234-246, 2020.
- [12] Siregar, N. U., et al., "Penerapan Aplikasi Geogebra pada Pembelajaran Matematika," *Journal on Education*, vol. 5, no. 3, pp. 8151-8162, 2023.
- [13] Murdiyanto, T. and Rohimah, S. R., "Pengembangan Media Pembelajaran Interaktif Berupa Aplikasi Komik Matematika dengan Pendekatan Kontekstual pada Materi Bentuk Aljabar Kelas VII SMP," *Jurnal Riset Pembelajaran Matematika Sekolah*, vol. 5, no. 2, pp.45-52, 2021.
- [14] Miles, M. B. and Huberman, A., *Qualitative data analysis: An expanded sourcebook*, Sage, 1994.
- [15] Moleong, L. J., *Metodologi penelitian kualitatif*, Remaja Rosdakarya, 2010.
- [16] Yudela, S., Putra, A., and Laswadi, L., "Pengembangan media pembelajaran matematika berbasis Youtube pada materi perbandingan trigonometri," *Imajiner: Jurnal Matematika dan Pendidikan Matematika*, 2020, vo. 2, no.6, pp. 526-539, 2020.
- [17] Isnaini, J. F. and Azhar, E., "Mathematics learning independence: The relationship of youtube as a media for mathematics learning," *Desimal: Jurnal Matematika*, vol.4, no.2, pp. 177-184, 2021.
- [18] Stole, H. "Why digital natives need books: The myth of the digital native", *First Monday*, 2018.
- [19] Igcasama, R.M, Ramirez, D. T., and Slanap, N. P., "Evaluation of photo math in teaching elementary algebra," *Journal of Education Research and Evaluation*, vol. 4, no. 4, pp. 408-413, 2020.
- [20] Yolandasari, T., Ubaidah, S., and Zulyanti, M. "Pengaruh penggunaan aplikasi photomath terhadap pemahaman konsep matematis siswa di sekolah menengah kejuruan negeri 1 kota jambi," UIN Sulthan Thaha Saifuddin Jambi, 2022.