Exploring the Experience of Informatics Education Students in Sharpening Thinking Skills Through Scratch

Beatrix Dasilva Tena[1], Maria Magdalena Beatrice Sogen[2], Yosep Gayus Miru[3], Fridolin Jaiman[4], Seregius Erdin Mowata[5]
Pendidikan Informatika, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Citra Bangasa
Email : beatryksthena@gmail.com[1]

Abstract
The rapid development of information technogy necessitates that informatics Education students prosess optimal sritical, creative, and problem-solving abilities development of higher-order thinking skill. This research aims to explore student's experinces in honing their thinking abilities through the use of Scratch as a learnig medium. The method employed is descriptive, qualitative, with data collected via quastionnaires distributed to sixth-semester students. The research findings incate that integrating Scratch encourages sdudents to be more active, and collaborative in learning, and enhances their critical, creative, and computational thinking skills. Scratch also effectively facilitates students in understanding programming logic, desgining algotithms, and solving problems independently. These findings support the winder utulization of Scratch to foster the development of thinking skills among informatics Education students.

Keywords: *Scratch, thinking skills, informatics education, visual programming, creativity*

INTRODUCTION

The development of information technology until now has grown rapidly along with the discovery and development of science in the field of information and communication. The development of information technology has driven significant changes in the world of education so that it is able to create learning media. Learning media is often used by students to assist in the learning process. One of the learning media that is often used by students is Scratch.

("Nurhayati, E., Dewi, S. V., & Setialesmana, D. (2023).," 2023) Scratch-based learning media has been proven to be suitable for use in classroom activities and meets the criteria for validity and effectiveness in problem solving. ("Kurniawan, H. (2019).," 2019) and (Prasetyo, A. R., & Putra, 2021) emphasize that the implementation of Scratch in algorithm learning can improve the logic skills of high school students, thereby facilitating the understanding of abstract programming concepts.

(Sari, R. P., & Hartono, 2022) Research shows that the use of Scratch in learning can improve students' systematic thinking skills and interest in programming. Scratch is considered beginner-friendly and effective as a learning medium.

(Dewi, L. K., & Santoso, 2019) This study reveals that the use of Scratch in informatics learning can improve learning outcomes and interests of elementary school students through a fun project-based learning approach. (Wijayanti, R., & Susanto, 2021) the results of the study show that learning using Scratch helps students understand programming logic visually. Scratch increases active participation between students. (Putra, A. T., & Lestari, 2020) in this journal it is explained that Scratch plays a role in forming critical thinking and problem-solving skills. Its use in the classroom makes learning more contextual and applicable.

(Prasetyo, D. Y., & Kurniawan, 2021) This study proves that the implementation of Scratch in algorithm learning significantly improves students' logical abilities. Scratch makes it easier for students to understand abstract algorithmic concepts through visualization.

(Fitriani, R., & Wibowo, 2020) stated that the use of scratch in junior high schools can make it easier for students to understand basic programming in an interactive and fun way. This is supported by (Amalia, N., & Firmansyah, 2021) who found that the use of the scratch application significantly improved the computational thinking skills of elementary school students, especially in terms of logic and problem solving.

In addition, (Saputra, A. R., & Lestari, 2020) emphasized that the use of scratch in

visual programming learning can increase students' creativity, so that they can be more flexible in developing programming ideas and solutions.

In line with this, (Prasetyo, A. R., & Putra, 2021) stated that the implementation of scratch in algorithm learning contributes to improving the logic abilities of high school students, which is an important foundation in mastering computer science and information technology.

(Yuliana, S., & Handayani, 2021) States that Scratch can be an effective means of honing and systematic programming. In a broader context, (Rahmawati, 2022) added that the use of scratch helps improve problem-solving skills in elementary school students, so that it can provide a strong foundation for displaying high-level thinking in the future. Scratch can help to create basic programming, such as creating various projects including animations, simple games, and interactive stories. Scratch as an effective tool for improving thinking skills, however, based on the results of observations and (Prasetyo, A. R., & Putra, 2021) interviews conducted, the experience of Informatics Education students in using Scratch was not optimal. Based on previous research conducted by (Nurhayati et al., 2023) on development of scratch-based learning media to optimize students' problem solving, the results found that Scratch-based learning media is suitable for use in classroom activities that meet the validity and effectiveness criteria.

However, there are still shortcomings in the study that need to be studied further. Previous studies have focused more on students' problem solving. Therefore, this study is very important to find out Informatics Education students' experience in honing their thinking skills through Scratch. In addition, this research also helps to develop more effective and targeted learning modules and able to facilitate independent exploration of ideas and problem solving.

METHOD

The method used in this research is a qualitative approach using qualitative descriptive analysis. Qualitative research is research that describes in detail and in depth and produces data in the form of words that come from written or spoken sources.(Anwar, M., & Dewi, 2021). The data collection technique used in the research is a questionnaire.

A questionnaire is a data collection technique that involves a series of written questions addressed to respondents with the aim of obtaining answers or obtaining information (Suryatman 2019).

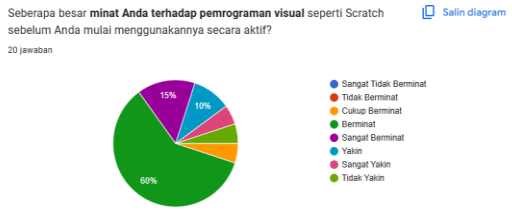
In this study, the data used is primary data. By using the questionnaire research method in this case study, it is expected to obtain a more comprehensive understanding of the perceptions, experiences, and satisfaction levels of informatics education students related to Scratch learning. The population in the study was all informatics education students with a research sample in semester 6 class A (20 people).

RESULTS AND DISCUSSION

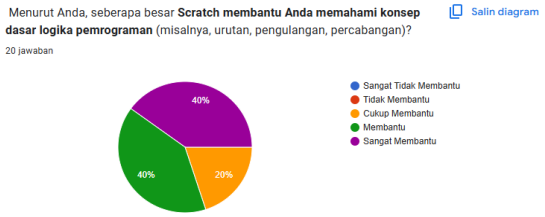
Based on the results of the analysis involving quantitative methods using questionnaires, the final results can be as follows:

1. Initial experience and perception of Scratch
   With this, students said they were quite confident in their ability to solve algorithmic problems without using Scratch.

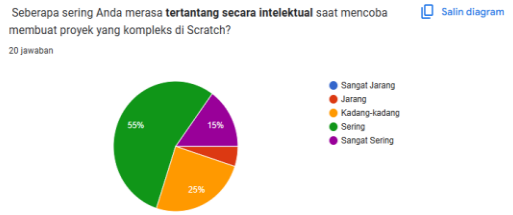
2. Students reported being interested in visual programming like Scratch before they actively used it.



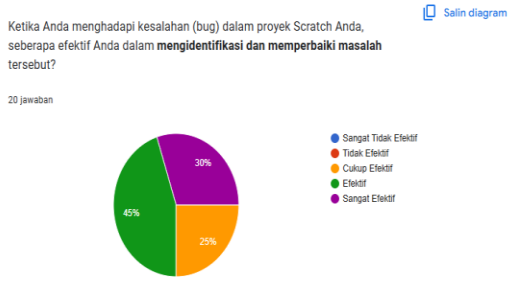
3. The data shows that it is very helpful for students to understand the basic concepts of programming logic using the Scratch application.



4. The data shows that students adapt easily to the visual interface and blocks in Scratch compared to text-based programming languages.

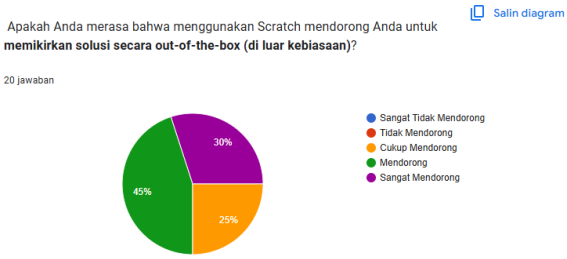


5. Learning process and challenges
   In this data, students often feel intellectually challenged when trying to create complex things in the Scratch application.
6. Students said that when faced with errors (bugs) in creating a project on the Scratch application, students identified and fixed the errors (bugs) that occurred in the Scratch application.

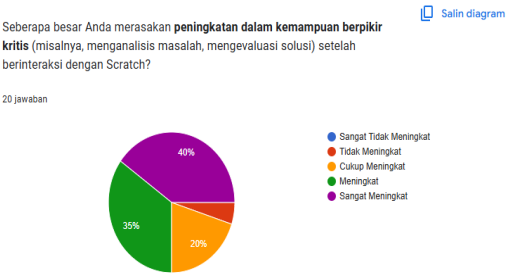


7. Students said that the role of experimentation is very large in the various combinations of blocks in the Scratch application, to help students find new solutions to the problems they face.

8. In this data, students feel that using the Scratch application can encourage them to think of out-of-the-box solutions.



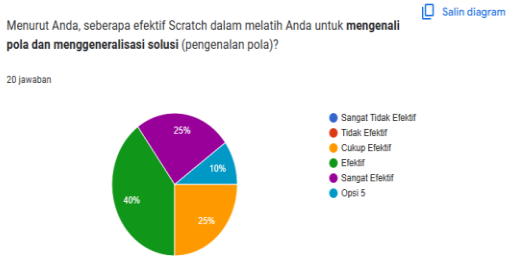
9. Students felt that their thinking patterns improved in critical thinking skills (e.g., analyzing problems, evaluating solutions) after they interacted with the Scratch application.



10. Students said they often collaborated with friends or sought help when working on particularly difficult Scratch projects.

11. Impact on computational thinking skills
    Students said that the Scratch application was very helpful for them in applying the concept of problem decomposition (breaking down a large problem into smaller parts).

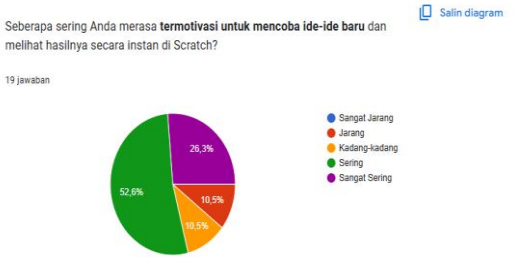
12. Students said that Scratch was very effective in training them to recognize patterns and generalize solutions (pattern recognition).



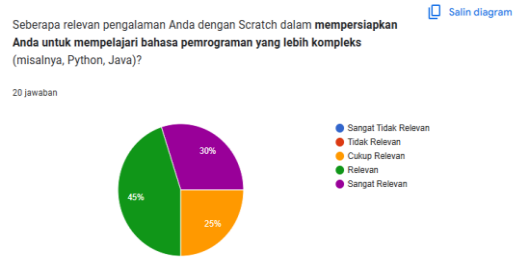
13. They say that Scratch plays a major role in improving students' ability to think critically (describing ideas without specific details).

14. Students said that using the Scratch application made it easier for them to design algorithms clearly and logically.

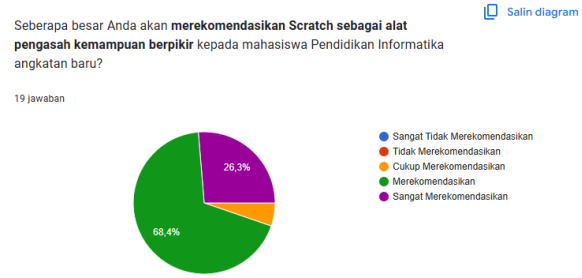
15. Students said they were highly motivated to try out new ideas and could see the results instantly in the Scratch app.



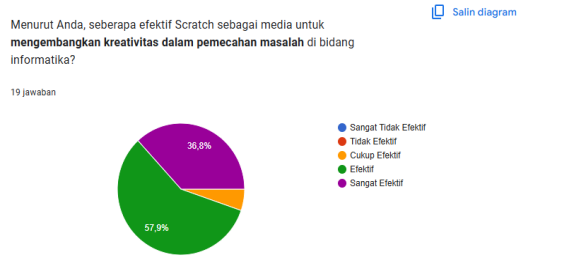
16. Relevance and recommendations
Students say that by using Scratch students can prepare themselves to learn more complex programming languages (e.g. Java and Python).



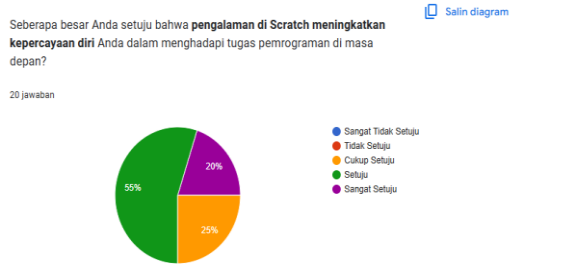
17. Students concluded that the Scratch application is highly recommended as a tool to sharpen thinking skills for new batches of Informatics Education students.



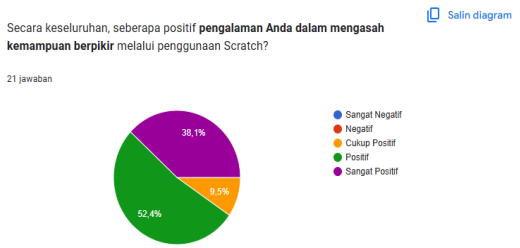
18. Students said that the Scratch application is very effective as a medium for developing creativity in problem solving in the field of informatics.



19. Students said that the experience of using the Scratch application can increase their confidence in facing programming tasks in the future.



20. Overall, students concluded how positive their experience was in honing their thinking skills through the use of the Scratch application.



The use of Scratch as a learning medium as a learning medium in the field of Informatics Education has proven effective in developing various student thinking skills, especially creative, critical, and computational thinking. This platform offers an open visual and interactive approach that makes it easier for students to understand programming concepts and develop innovative solutions to the problems they face.

The use of Scratch encourages students to imagine, design, and realize their ideas in the form of animations, games, or interactive simulations. This process trains them to elaborate ideas, rearrange elements, and build new structures that are functional and meaningful. Research shows that Scratch-based learning creates a more lively, active, and enjoyable learning atmosphere, so that students are more enthusiastic and motivated in following the learning process. This has a significant impact on improving students' creative and critical thinking skills.

Scratch also plays an important role in developing computational thinking patterns, namely the ability to break down complex problems into simpler parts, think logically, and design algorithms for solving. Through the creation of Scratch projects, students are trained to plan, organize, and test their solutions independently. Other studies have shown that the integration of Scratch in learning can significantly improve problem-solving and high-level thinking skills.

In addition to the cognitive aspect, Scratch also increases learning motivation and collaboration between students. A dynamic and collaborative learning environment is created because students can share ideas, discuss, and work together to complete projects. This strengthens soft skills and builds students' confidence in facing the challenges of the global world.

However, the implementation of Scratch also faces challenges such as limited access to devices, digital skills gaps, and the need for training for students. However, the benefits obtained are much greater, especially in preparing students to become creative, innovative, adaptive individuals, to technological developments.

The exploration of Informatics Education students' experiences in using Scratch proves that this platform is effective in developing creative, critical, and computational thinking skills. Scratch is not only a programming learning tool, but also a vehicle for developing students' potential to meet the challenges of the 21st century.

CONCLUSION

The conclusion of this article shows that the use of Scratch in Informatics Education students' learning is significantly able to develop creative, critical, and computational thinking skills. Through the exploration of student experiences, it was found that Scratch not only facilitates the understanding of programming concepts, but also encourages students to be more active, innovative, and collaborative in project-based learning processes and visual-interactive media such as Scratch are very relevant to improving human resources in the digital era.

SUGGESTION

Suggestions for further studies are (1) to expand research from various levels of education and student backgrounds to obtain a more comprehensive picture, (2) to develop nationally, (3) to carry out ongoing training for lecturers and students to optimize the use of technology in informatics learning.

ACKNOWLEDGEMENT

The author would like to express his deepest gratitude to the parties who helped with the financial support that has been provided so that this research can be carried out properly.

BIBLIOGRAPHY

Amalia, N., & Firmansyah, D. (2021). (2021). Efektivitas penggunaan aplikasi Scratch

dalam meningkatkan kemampuan berpikir komputasional siswa sekolah dasar. Jurnal Ilmiah Pendidikan Komputer, 10(2), 134–142. Efektivitas Penggunaan Aplikasi Scratch Dalam Meningkatkan Kemampuan Berpikir Komputasional Siswa Sekolah Dasar. Jurnal Ilmiah Pendidikan Komputer, 10(2), 134–142.

Anwar, M., & Dewi, F. (2021). (2021). Anwar, M., & Dewi, F. (2021). Studi kualitatif dalam bidang sosial: Konsep dan aplikasi. Jurnal Sosial Humaniora, 9(3), 210-220. Studi Kualitatif Dalam Bidang Sosial: Konsep Dan Aplikasi. Jurnal Sosial Humaniora, 9(3), 210-220.

Dewi, L. K., & Santoso, B. (2019). Dewi, L. K., & Santoso, B. (2019). Pengaruh Pembelajaran Berbasis Scratch Terhadap Kemampuan Berpikir Algoritmik Siswa. Jurnal Pendidikan Informatika, 8(2), 75-85.

Fitriani, R., & Wibowo, A. (2020). (2020). Fitriani, R., & Wibowo, A. (2020). Pemanfaatan Scratch sebagai media pembelajaran pemrograman dasar di Sekolah Menengah Pertama. Jurnal Pendidikan Teknologi dan Kejuruan, 16(2), 125–134. https://ejournal.unesa.ac.id/index.php/jptk/article/view/xxxxx. Pemanfaatan Scratch Sebagai Media Pembelajaran Pemrograman Dasar Di Sekolah Menengah Pertama. Jurnal Pendidikan Teknologi Dan Kejuruan, 16(2), 125–134.Https://Ejournal.Unesa.Ac.Id/Index.Php/Jptk/Article/View/Xxxxx.

Kurniawan, H. (2019). (2019). Penerapan Pembelajaran Berbasis Proyek Menggunakan Scratch Untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa. Jurnal Inovasi Teknologi Pendidikan, 6(1), 13–23.

Nurhayati, E., Dewi, S. V., & Setialesmana, D. (2023). (2023). Pengembangan Media Pembelajaran Berbasis Scratch Untuk Mengoptimalkan Problem Solving Siswa. Aksioma: Jurnal Program Studi Pendidikan Matematika, 12(1), 8-71. Https://Doi.Org/10.24127/Ajpm.V12i1.6520.

Prasetyo, A. R., & Putra, I. M. (2021). (2021). Prasetyo, A. R., & Putra, I. M. (2021). Pengaruh Penggunaan Scratch Terhadap Kemampuan Berpikir Kritis Dan Kreatif Siswa. Jurnal Pendidikan Teknologi Dan Kejuruan, 27(2), 145-155.

Prasetyo, D. Y., & Kurniawan, A. (2021). (2021). Prasetyo, D. Y., & Kurniawan, A. (2021). Implementasi Scratch dalam pembelajaran algoritma untuk meningkatkan kemampuan logika siswa sekolah menengah. Jurnal Teknologi dan Pembelajaran Informatika, 5(1), 23–31. Implementasi Scratch Dalam Pembelajaran Algoritma Untuk Meningkatkan Kemampuan Logika Siswa Sekolah Menengah. Jurnal Teknologi Dan Pembelajaran Informatika, 5(1), 23–31.

Putra, A. T., & Lestari, D. P. (2. (2020). 020). Pengembangan Kreativitas Dan Kepercayaan Diri Mahasiswa Melalui Pembelajaran Berbasis Scratch. Jurnal Teknologi Pendidikan, 12(4), 298-307.

Rahmawati, L. (2022). (2022). Rahmawati, L. (2022). Penggunaan Scratch untuk meningkatkan kemampuan pemecahan masalah pada siswa sekolah dasar. Jurnal Pendidikan Dasar Indonesia, 4(2), 101–110.https://ejournal.example.com/index.php/jpdi/article/view/xxxx. Penggunaan Scratch Untuk Meningkatkan Kemampuan Pemecahan Masalah Pada Siswa Sekolah Dasar. Jurnal Pendidikan Dasar Indonesia, 4(2), 101–110. Https://Ejournal.Example.Com/Index.Php/Jpdi/Article/View/Xxxx.

Saputra, A. R., & Lestari, S. (2020). (2020). Saputra, A. R., & Lestari, S. (2020). Penerapan media Scratch dalam pembelajaran pemrograman visual untuk meningkatkan kreativitas mahasiswa. Jurnal Pendidikan dan Pembelajaran Informatika, 9(1), 45–53. https://ejournal.example.com/index.php/jppi/article/. Penerapan Media Scratch Dalam Pembelajaran Pemrograman Visual Untuk Meningkatkan Kreativitas Mahasiswa. Jurnal Pendidikan Dan

Pembelajaran Informatika, 9(1), 45–53. Https://Ejournal.Example.Com/Index.Php/Jppi/Article/View/Xxxx.

Sari, R. P., & Hartono, Y. (2022). (2022). . Pemanfaatan Scratch untuk meningkatkan kemampuan berpikir komputasional siswa. Jurnal Teknologi Pendidikan, 14(3), 210-221. Pemanfaatan Scratch Untuk Meningkatkan Kemampuan Berpikir Komputasional Siswa. Jurnal Teknologi Pendidikan, 14(3), 210-221.

Sari, R. P., & H. (2022). (2022). Sari, R. P., & Hartono. (2022). Pengaruh Penggunaan Scratch terhadap Peningkatan Kemampuan Berpikir Sistematis Siswa Sekolah Dasar. Jurnal Teknologi Pendidikan Anak, 7(1), 45–53. Pengaruh Penggunaan Scratch Terhadap Peningkatan Kemampuan Berpikir Sistematis Siswa Sekolah Dasar. Jurnal Teknologi Pendidikan Anak, 7(1), 45–53.

Wijayanti, R., & Susanto, H. (2021). (2021). Wijayanti, R., & Susanto, H. (2021). Wijayanti, R., & Susanto, H. (2021). Peran Scratch Dalam Mempersiapkan Mahasiswa Menghadapi Pemrograman Tingkat Lanjut. Jurnal Pendidikan Teknik Informatika, 10(1), 45-53.

Yuliana, S., & Handayani, T. (2021). (2021). Pemanfaatan Scratch sebagai sarana pengembangan kemampuan berpikir kritis siswa. Jurnal PeYuliana, S., & Handayani, T. (2021). ndidikan dan Teknologi Informasi, 8(2), 72–81. https://ejournal.example.com/index.php/jpti/article/view/xxxx. Pemanfaatan Scratch Sebagai Sarana Pengembangan Kemampuan Berpikir Kritis Siswa. Jurnal PeYuliana, S., & Handayani, T. (2021). Ndidikan Dan Teknologi Informasi, 8(2), 72–81. Https://Ejournal.Example.Com/Index.Php/Jpti/Article/View/Xxxx.