



Student Creativity Through the Use of *Chromebooks* in Biology Learning at SMAS IT Darul Istiqamah

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Abstract

This research aims to analyze and describe student creativity through the use of Chromebooks in Biology learning at SMAS IT Darul Istiqamah. As an educational institution proactive in technological innovation and holding Google Reference School status, SMAS IT Darul Istiqamah has extensively integrated Chromebooks into its teaching and learning process. This descriptive qualitative research employed interviews with 15 students from Grades X, XI, and XII, as well as the Biology Teacher and the Head of School. The findings indicate that Chromebooks significantly facilitate student creativity in Biology learning through various digital manifestations. Students are able to produce innovative works such as 3D cell models, collaborative digital comics, and Artificial Intelligence (AI)-based applications like Teachable Machine, reflecting their unique visualization and application of Biology concepts. The devices also support collaborative creative processes and are effective in enhancing student focus by reducing distractions. Furthermore, Chromebooks facilitate the exploration of creative ideas through differentiated learning and the utilization of AI, while simultaneously increasing student motivation and engagement to become producers of innovative works. These findings are reinforced by the perspectives of the teacher and head of school, who observe the positive impact of Chromebooks on creativity and a conducive learning environment.

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INTRODUCTION

The 21st century is marked by the acceleration of a fundamental digital revolution, which has significantly transformed the way humans interact, work, and learn. These changes have forced educational institutions to make profound adaptations in order to prepare students to face increasingly complex challenges in the global era (Latifah, 2024). The use of technology in the learning process is no longer an option, but a strategic necessity to create education that is more inclusive, interactive, and relevant to the demands of the times (Widyasari, 2024). This transformation is in line with the demands of educational globalization, which encourages every institution to proactively adopt digital advances. However, on the other hand, the integration of technology in learning also presents significant challenges. Without proper management, digital devices loaded with various applications and entertainment content can become a major source of distraction, diverting students' attention from their learning objectives (Santos, 2023).

The integration of technology in learning, on the other hand, presents significant challenges that require special attention. This dilemma is highlighted by Berges-Puyo's (2024) research, which argues that the impact of technology on students' cognitive abilities is twofold. On the one hand, technology offers great potential to improve the efficiency and effectiveness of the learning process, such as quick access to information and abundant multimedia resources. However, if its use is not directed and well-managed, technology can actually erode students' capacity for focus, depth of thought, and memory. This creates a paradox in the world of education: how to optimize the potential of technology as a powerful learning tool without sacrificing the fundamental cognitive skills necessary for long-term success.

This phenomenon underscores the need for an implementation strategy that focuses not only on providing devices, but also on managing the digital ecosystem as a whole. This challenge requires schools to move beyond passive technology adoption and shift to a more structured approach. In other words, the solution does not lie in rejecting technology, but in developing methodologies and policies that minimize the risk of distraction and maximize educational benefits. This strategy is essential to bridge the gap between the promise of technology for innovation and the real challenges of maintaining student focus, an issue that this study attempts to address through case studies in schools that have adopted a managed *Chromebook* system.

This development requires a paradigm shift in learning from a teacher-centered approach to a student-centered approach. In this context, students are expected to be not only passive recipients of information, but also producers of knowledge and creative work. To achieve this goal, supportive tools and environments are needed. The implementation of structured and integrated educational technology, such as the use of *Chromebooks*, is one strategic solution to bridge the gap between the demands of the digital era

and the reality of learning in schools. SMAS IT Darul Istiqamah, as an institution that is proactive in innovation, has adopted this approach comprehensively, making this school a relevant and data-rich case study (GEG Indonesia, 2024).

In the context of education, creativity is often defined as the ability to generate new ideas that are original and useful, relevant to the task at hand (Sudarti, 2020). The relationship between creativity and technology, especially *Chromebooks*, is very close. *Chromebooks* not only serve as tools for accessing information, but also as platforms that allow students to express their creative ideas in digital formats. This includes creating comics, infographics, animated videos, and interactive 3D models, all of which require a combination of subject knowledge (in this case, biology), visual skills, and innovative thinking. Therefore, the use of *Chromebooks* is directly related to the title of this study, namely as a medium that can facilitate and manifest students' creativity in biology learning.

Biology learning is a learning process that aims to understand life and living organisms. Innovation in Biology learning is essential to improve the quality of learning and make students more enthusiastic about studying Biology. By using technology, applications, videos, and other methods, students can learn Biology in a more interactive atmosphere and be better prepared to face future challenges (Widyasari, 2024). Amidst this complexity, biology learning as a discipline that focuses on understanding life and organisms demands continuous innovation. Conventional learning methods are often considered uninteresting and fail to maximize students' curiosity. The use of technology, including computers and other digital devices, offers a potential solution by allowing students to access interactive learning resources, conduct virtual experiments, and collaborate more dynamically (Ikhtiara et al., 2022). This approach is in line with the six key elements of science learning, namely *active learning*, *discovery/inquiry approach*, and scientific literacy development. However, the effective adoption of technology in biology learning still faces obstacles, particularly related to infrastructure readiness and appropriate methodologies.

Several studies have examined the role of technology in learning, but there are still significant gaps. Kresnadi et al. (2023) showed that the use of ICT can improve understanding of Biology concepts, but the study did not specifically explore how ICT triggers creativity. Other studies, such as those conducted by Supriadi & Muis (2022) and Rohmah et al. (2024), have identified the positive impact of *Chromebook* use on student learning outcomes and engagement. However, their findings are often general and do not explore in depth the unique manifestations of student creativity, especially in the context of learning Biology that is integrated with modern technology such as *AI*.

These studies show that while the technology has proven effective, the focus remains largely on general cognitive and affective aspects, rather than on the development of complex and difficult-to-measure creative skills. Furthermore, Limone & Toto (2021) demonstrate the use of *Chromebooks* in higher education, showing the adoption of this technology at various levels, but their research does not specifically highlight its impact on student creativity at the secondary school level.

The most pressing research gap is a comprehensive understanding of how a managed technology ecosystem, such as that offered by *Chromebooks* in a *Google Reference School* (GRS) environment, can overcome distraction issues while simultaneously facilitating student creative expression. The uniqueness of *Chromebooks* lies in their lightweight operating system and full integration with *Google for Education* services, making them ideal devices for centralized school environments. This distinguishes them from other common devices (laptops or smartphones) that often load a variety of non-educational applications, creating challenges for student control and focus.

Therefore, this study focuses on this gap. This study uses SMAS IT Darul Istiqamah as its research object, a school that actively implements *Chromebooks* and has been recognized as a GRS. The GRS criteria indicate optimal use of *Chromebooks* and a high commitment to integrating Google technology into learning (GEG Indonesia, 2024).

This study explicitly tests the hypothesis that a well-managed technological environment, such as the *Chromebook* ecosystem, can be an effective facilitator of student creativity, which was previously often hampered by distractions and device limitations. The results of this study are expected to serve as practical guidance for schools in Indonesia that are striving to integrate technology responsibly and aim to produce students who are not only tech-savvy, but also creative, collaborative, and ready to face future challenges.

Thus, this study aims to comprehensively analyze and describe student creativity through the use of *Chromebooks* in biology learning, as well as provide valuable insights into how managed technology can be a powerful tool for enhancing student creativity and digital literacy, while mitigating its negative impacts. The ultimate goal of this study is to present an implementation model that can be replicated by other schools that share a similar vision of effectively integrating educational technology.

RESEARCH METHOD

This study adopts a descriptive-qualitative approach, which is a study that provides a systematic description of stimuli and factual events as well as factors, characteristics, and relationships between phenomena for conducting basic research (Sugiyono, 2020) with a case study design. A case study is a qualitative research design that aims to explore complex phenomena in a real context in depth. This design is particularly useful when researchers want to understand the unique characteristics of a particular case and explore the contextual details that influence the phenomenon (Erni Rosmita, 2024). This approach was chosen to provide an in-depth and comprehensive description of a complex social phenomenon, namely the role of *Chromebooks* in facilitating student creativity in biology learning at SMAS IT Darul Istiqamah. As a case study, this research focuses intensively on one specific location, allowing for the exploration of phenomena in their unique and detailed contexts. This method is in line with the principles of qualitative research, in which researchers act as the main instruments for collecting and interpreting data from the field.

The subjects of this study consisted of 15 students spread across grades X, XI, and XII, as well as one Biology teacher and one Principal of SMAS IT Darul Istiqamah. The subjects were selected using *purposive sampling*, in which informants were chosen based on relevant criteria and were considered to have in-depth knowledge and direct experience related to the phenomenon being studied (Mulyasari et al., 2023). The main material or tool that was the focus of the study was the *Chromebook* device that was routinely used by students.

The main variable measured was student creativity, which was identified through multidimensional indicators such as the ability to generate unique ideas, create innovative works, and demonstrate flexibility in the learning process. The main instrument used for data collection was interviews (Limone & Toto, 2021). These interviews were designed with a structured set of questions. To strengthen and validate the

findings, this study also used participant observation to directly observe students' interactions with *Chromebooks* and their creative processes. In addition, documentation in the form of photographs and students' digital works (such as comics, presentations, and 3D models) were also collected as supplementary data.

The qualitative data obtained from interviews, observations, and documentation was then analyzed using Miles and Huberman's interactive model. This analysis technique includes three main stages that interact continuously: (1) Data Reduction, which is the process of filtering and selecting raw data that is most relevant to the research focus; (2) Data Presentation, where the reduced data is presented in the form of narratives, tables, and direct quotes from informants to facilitate understanding; and (3) Drawing Conclusions, which is the process of drawing final conclusions that are validated through data triangulation from various sources (students, teachers, principals, and documentation) to ensure the validity and reliability of the findings (Purnawanto, 2023). This procedure is designed to be concise and informative, allowing readers to understand the research flow and validate the results independently.

The qualitative approach with a case study design was deliberately chosen because of the nature of this research, which aims to explore complex and contextual phenomena. Unlike quantitative approaches that focus on measurement and generalization, case studies allow researchers to explore the "why" and "how" of a phenomenon. In this case, researchers can fully understand how student creativity manifests itself, what factors influence it, and how the interaction between students, teachers, and *Chromebook* technology shapes the process in the context of biology learning. This design is ideal for capturing narratives, perspectives, and unique experiences that cannot be measured through statistical data (Erni Rosmita, 2024).

The selection of SMAS IT Darul Istiqamah as a case study is also based on strong criteria. This school is not just a *Chromebook* user, but has been recognized as a *Google Reference School* (GRS), which indicates a mature and well-managed digital ecosystem (GEG Indonesia, 2024). Therefore, this school is an ideal case for testing the hypothesis that a well-managed technological environment can effectively facilitate student creativity, while also addressing existing research gaps.

RESEARCH FINDINGS AND DISCUSSION

Results

Based on qualitative research findings obtained through a series of in-depth interviews, participant observation, and documentation of students' digital work, the use of *Chromebooks* in biology learning at SMAS IT Darul Istiqamah has shown a significant and multidimensional impact. These findings highlight how an effectively managed digital ecosystem can fundamentally transform students' thinking, creativity, and social interaction processes, in line with 21st-century learning objectives. This phenomenon proves that the right tools, supported by strong school policies, can be catalysts for educational innovation and holistic student development.

Interviews with students reveal that the meaning of creativity in the context of Biology learning goes beyond simply memorizing facts. According to their understanding, creativity is the ability to present or apply Biology concepts in unique, visual, or innovative ways. This is evident in the original works they have created, which are the result of their own understanding. This manifestation of creativity is realized in various innovative digital forms. For example, 11th grade students innovatively use web-based applications such as *Assemblr Edu* to create interactive three-dimensional models of animal cells. This

creation not only requires a deep understanding of the structure and function of cell organelles, but also complex digital visualization skills. In addition, collaborative tasks to create digital comics about biodiversity or infographics of complex material using *Google Slides* or *Canva* are clear examples of students' ability to creatively combine text, images, and layout. These findings are in line with previous research by Rohmah et al. (2024) and Supriadi & Muis (2022), which also found a positive impact of *Chromebook* use on student engagement and learning in general. However, these studies tend to be general in nature and do not explore the manifestations of creativity in depth as found in this study, which identifies specific forms of work such as 3D models and digital comics. The highest manifestation of creativity was realized when students created a simple application to identify organs using *Teachable Machine*, an *AI-based* application. These projects demonstrate how students apply Biology concepts in unique ways with the help of technology.

This study also confirms that *Chromebooks* are effective in improving student focus by reducing distractions. Most students feel that these devices help them stay focused on Biology material because there are few non-educational applications, such as social media or *games*, that can interfere with their concentration. Biology teachers also confirmed this, stating that *Chromebooks* feel "*safer* because irrelevant content cannot be accessed, which directly improves students' focus on Biology material." These findings critically confirm the second part of the research framework, which states that *Chromebooks* are a solution to overcome the negative impacts of technology. Unlike previous studies that focused on the general usefulness of ICT (Kresnadi et al., 2023), these findings specifically highlight the comparative advantages of *Chromebooks* in creating a controlled learning environment, allowing students' creative energy to be channeled more productively.

Furthermore, the results show that the ease of access and *real-time* collaboration facilitated by the *Google Workspace* ecosystem on *Chromebooks* significantly strengthens constructivist learning. Unlike conventional methods where students often work individually, *Chromebooks* encourage them to actively build knowledge together through collaborative projects. Observations show that students with different levels of understanding can complement each other, where one student who is skilled in visualization can help another student who is more focused on theoretical concepts. This dynamic interaction not only improves understanding but also fosters social and collaborative skills that are essential in the 21st century.

Interviews with Biology teachers provided additional perspective on the flexibility *Chromebooks* offer in implementing differentiated learning strategies. Teachers stated that these devices made it easier for them to tailor teaching materials to individual student needs, including providing additional learning resources for students who needed more support or more complex challenges. This success confirms the findings of Smith & Jones (2021) on how technology, particularly AI, can support personalized learning. By utilizing tools such as *Google Classroom* and *Teachable Machine*, teachers can monitor student progress individually and provide more targeted feedback, which ultimately contributes to increased creativity and conceptual understanding.

Additionally, interviews with the Principal highlighted that the implementation of *Chromebooks* is part of the school's strategic vision to create a safe and innovative learning environment. The decision to adopt this *one-to-one* device system is not merely about providing tools but also a commitment to fostering a positive digital culture. The Principal views *Chromebooks* as a "controlled digital window," enabling the school to minimize the risk of distractions

from social media and entertainment content, allowing students to focus entirely on academic goals. This perspective adds a new dimension to the understanding of the role of technology in education, namely as a tool that not only facilitates creativity but also as an instrument for behavior management and the formation of students' digital character.

Finally, the findings from this study indicate a transfer of creative skills between subjects. Students who are accustomed to using *Chromebooks* for visual projects in other subjects (e.g., creating history presentations or geography infographics) tend to adapt more easily and apply similar creative ideas in Biology learning. This indicates that digital literacy skills developed through the use of *Chromebooks* in one subject area have a positive effect that extends to other subject areas, reinforcing the argument that investing in technology that is holistically integrated across the school curriculum will have a more significant impact.

Discussion

Based on qualitative research findings obtained through a series of in-depth interviews, participant observations, and documentation of students' digital work, the use of *Chromebooks* in Biology learning at SMAS IT Darul Istiqamah shows a significant and multi-dimensional impact. The results of this study not only confirm the role of technology as a tool, but also highlight how an effectively managed digital ecosystem can fundamentally transform students' thinking, creativity, and social interaction processes, in line with 21st-century learning objectives. This phenomenon proves that the right tools, supported by strong school policies, can be catalysts for educational innovation and holistic student development.

Chromebooks have proven to be the primary medium that facilitates and accommodates students' creative expression in biology learning. This is directly in line with Sudarti's (2020) theory of creativity, which defines creativity as the ability to create something new or combine existing elements into something innovative. This manifestation of creativity is evident in the diverse digital works produced by students, transcending the boundaries of conventional learning methods dominated by text or two-dimensional image presentations. For example, specific findings show that 11th-grade students innovatively used *web-based* applications such as Assemblr Edu to create interactive three-dimensional models of animal cells. This creation not only requires a deep understanding of the structure and function of cell organelles, but also complex digital visualization skills. These works prove that *Chromebooks* provide space for students to combine their knowledge of biology with their visual and artistic skills.

Additionally, collaborative assignments to create digital comics about biodiversity or infographics on complex material using *Google Slides* or Canva are clear examples of students' ability to creatively combine text, images, and layout. These visual works clearly reflect the characteristics of creative students as described by Ratno et al. (2024), namely the ability to think *outside the box* and have a broad imagination in presenting material in an interesting and easy-to-understand way (Cahyaningrum et al., 2024).

The role of *Chromebooks* in stimulating creativity is also evident in the flexibility they offer, allowing students to explore various formats and ideas without hardware limitations. The use of *Chromebooks* also encourages students to be more reflective and adaptive, as they must continuously modify and refine their digital work based on feedback from teachers and peers. This iterative process is at the core of the creative process, where initial ideas continue to evolve and be enriched (Hakim, 2023).

Furthermore, the *one-to-one* implementation of *Chromebooks* at SMAS IT Darul Istiqamah has changed the learning paradigm from simply listening and taking notes to *learning by doing*. Students are no longer passive, but are directly involved in the digital creation process that requires them to actively apply the biology knowledge they have learned. This activity builds connections between theory and practice, where conceptual understanding is reinforced through real experiences in creating a creative product. This not only improves retention of subject matter but also trains critical thinking and problem-solving skills, which are important prerequisites for creative competence (Amalia, 2022).

In addition to its creative role, *Chromebooks*, which are fully integrated with the *Google Workspace* ecosystem (such as *Google Docs*, *Slides*, and *Jamboard*), tangibly support constructivist learning theory (Jayawardana & Sugiarti, 2020). In this context, students do not merely act as passive recipients of information conveyed by teachers, but actively construct their own knowledge through interaction with learning resources and peers. Observations show that students are able to collaborate effectively in compiling digital reports, research projects, and group presentations. Easy access to *the cloud* and *real-time* collaboration features on *Chromebooks* facilitate this process, allowing each group member to contribute simultaneously, regardless of their physical location within the school environment. This is in line with Amalia's (2022) opinion, which emphasizes the importance of collaboration skills as one of the essential competencies for success in the 21st century.

More than just facilitating collaboration, *Chromebooks* also fundamentally transform the role of students. Students are no longer limited to being passive consumers of information, but become producers of innovative works who are able to manifest their understanding into various digital forms. The creation of digital *flipbooks*, comics, and even simple *AI* applications is concrete evidence that *Chromebooks* have succeeded in opening up a dimension of digital creativity that has not been widely explored in previous studies. This transformation correlates positively with the increase in student motivation and activity reported by Cahyaningrum et al. (2024), where a sense of ownership and pride in the work they produce becomes the main driver of their enthusiasm for learning.

One of the most notable findings and comparative advantages of this study is the effectiveness of *Chromebooks* in reducing distractions and negative impacts often associated with the use of technology in school environments. Unlike other versatile devices such as personal laptops or smartphones that have unlimited access to social media, *games*, and non-educational content, the *Chrome OS* operating system on *Chromebooks* is specifically designed for educational environments. This is supported by the perspectives of the students, teachers, and principals who were interviewed. The lightweight operating system, which is limited to educational applications, coupled with strict administrative controls in schools through *the Google Admin Console* (Acer, 2023), can prevent students from being tempted to open applications or websites that are not relevant to learning.

This condition effectively creates a safe and conducive learning environment, allowing students to be more focused and productive. This effect directly addresses the dilemma raised by Santos (2023) regarding the risk of technology as a source of distraction. By minimizing the risk of internet addiction and device misuse, schools have succeeded in maximizing the potential of technology for purely educational purposes. The use of *Chromebooks* as the only digital device in schools also indirectly trains students to use them optimally for learning purposes only, reinforcing the argument that protective device usage policies are key to maximizing the potential of educational technology.

More deeply, the *Chromebook* environment at SMAS IT Darul Istiqamah holistically shapes a positive digital culture, going beyond mere access restrictions. Students, whose focus is completely absorbed in learning and creative activities, unconsciously no longer have the desire to search for or try to access *online games* that may still be accessible. This shows that the effectiveness of *Chromebooks* lies not only in technical restrictions, but also in their success in creating a highly engaging and interactive learning environment, so that students' energy and attention are naturally diverted from distractions. They feel safer and more confident in experimenting with various digital tools because they understand that the entire device ecosystem is specifically designed for educational purposes. This sense of security minimizes concerns about data misuse or online risks, allowing all their mental energy and creativity to be fully channeled into the learning and collaboration process.

On the other hand, this positive digital culture also provides significant benefits for educators. Biology teachers feel more comfortable and in control when supervising and guiding students, as full visibility of student activities on screen through integrated monitoring features fosters an atmosphere of mutual trust between educators and students. Teachers feel more confident in allowing creative exploration, as they are assured that students will use the devices responsibly. The integration of school policy with this device technology reinforces the argument that the successful implementation of educational technology depends heavily on the synergy between the devices, the curriculum, and a supportive school culture.

In interviews, students consistently expressed that using *Chromebooks* made learning biology more enjoyable and less monotonous. They felt more motivated to do assignments that allowed them to "play" with ideas and visualize concepts. One 11th-grade student commented, "Creating animal cells with a 3D application is much more exciting than just taking notes in a book. We can be creative with images and stories." This indicates that *Chromebooks* have succeeded in breaking down the psychological barriers that often make students perceive Biology as a difficult and boring subject.

This view is reinforced by the Biology teacher, who stated that *Chromebooks* give him tremendous flexibility in designing lessons. Teachers can easily provide different materials for groups of students with different levels of understanding (*differentiated instruction*) and monitor their progress in *real time*. "I can see directly how each group of students is collaborating on their *Google Slides*. I can give immediate feedback without having to wait for them to finish," he said. From the Principal's perspective, the implementation of *Chromebooks* is part of the school's long-term vision to become an institution that is ready to face global challenges. He sees the increase in student creativity as a key indicator of the program's success, adding that *Chromebook's* managed security system has made it a wise and responsible investment. This is also in line with the school's efforts to equip students with 21st-century skills (GEG Indonesia, 2024).

This study also reveals how *Chromebooks* are an ideal platform for facilitating personalized and differentiated learning through the use of *AI* technology. Students reportedly use *generative AI* such as Gemini and *ChatGPT* as learning assistants to understand complex biology concepts independently and at their own pace. This utilization is in line with the findings of Hasan and Rahman (2024), who state that *AI* can enable learning experiences tailored to individual needs.

Furthermore, the finding that students created simple applications to identify organs using *Teachable Machine* shows how they use *AI* as a tool for creation, not just consumption. This project proves that *Chromebooks* are not just tools for accessing information, but also platforms for innovation. The use of these devices to access various sources relevant to students of different ability levels (Grades

10, 11, 12) also confirms Payne's (2025) opinion on the importance of technology in supporting differentiated learning.

Through the integration of *AI* technology, *Chromebooks* help teachers provide relevant and challenging material for each student, sparking the creation of new ideas that suit their individual interests and abilities. Overall, these findings show a strong synergy between hardware, software, and school policy in creating an innovative and effective learning ecosystem.

From all these findings, it can be concluded that the advantage of *Chromebooks* lies not only in their technical features, but also in their ability to integrate pedagogical aspects. The implementation of these *one-to-one* devices has created a *project-based learning* environment that encourages students to become creative *problem solvers*. Projects such as creating 3D cell models, digital comics, or *AI* applications not only test students' theoretical understanding, but also require them to design, implement, and evaluate their own work. This approach directly addresses the challenges of learning in the digital age by making technology a tool for creation, not just consumption, thereby fostering students' independence and sense of responsibility for their learning process.

The adoption of *Chromebooks* also opens up opportunities for collaboration that transcend the physical boundaries of the classroom. Thanks to integration with Google Workspace, students can collaborate on group projects in *real time*, both inside and outside of school hours. This significantly reduces the logistical barriers often encountered in group-based learning and directly supports the development of collaboration skills, which are recognized as one of the key competencies of the 21st century. These features also allow teachers to monitor each student's individual contributions, ensuring that no group members are passive, and providing detailed and timely feedback, a process that is rare in traditional learning models.

Furthermore, the findings of this study confirm that the successful implementation of educational technology, in this case *Chromebooks*, is highly dependent on the synergy between devices, curriculum, and school culture. *Chromebooks* are not just hardware, but an integral part of a learning ecosystem supported by strong school policies, such as *one-to-one* systems and administrative controls. These policies create a safe and focused environment where students feel comfortable experimenting and creating without worrying about distractions or misuse. The trust built between teachers and students through this transparent monitoring system is an important foundation for the creative exploration process, where teachers feel confident in giving students more freedom, and students feel responsible for their use of the devices. This synergy is a model that can be emulated by other educational institutions seeking to integrate technology holistically and effectively.

CONCLUSION

The most surprising finding of this study is how *Chromebooks*, often viewed as simple devices, effectively function as a "gateway" that controls and directs students' digital behavior. In a boarding school environment where *Chromebooks* are students' only digital window, these devices have proven to be significant in reducing distractions from social media and games. This allows

students to focus entirely on academic tasks and indirectly encourages them to channel their creative energy into learning-relevant work, such as creating 3D cell models or collaborative digital comics. This finding could only be discovered after the study was conducted, as it shows that Chromebooks are not only facilitation tools but also effective digital monitoring instruments, creating a positive digital culture among students.

This research contributes a new perspective to the world of education by showing how the implementation of controlled technology can be a solution to the challenge of digital distraction, which is a crucial issue in today's era. This study not only confirms that technology enhances creativity, but also challenges the assumption that digital devices must be "open" to support creativity. Instead, this study proves that a "restricted" digital environment focused on learning can actually maximize students' creative potential. Thus, this study contributes the concept of "creativity within a controlled framework" and provides concrete examples of innovative products, such as the Biology AI application, which can be used as a reference for further research and educational practices.

This study has several limitations, namely the limited nature of qualitative-descriptive research. This study also has sample limitations, involving only 15 students, one Biology teacher, and one principal from one specific location, namely SMAS IT Darul Istiqamah. These limitations restrict the generalization of findings to other schools with different characteristics. Therefore, further research is needed using quantitative methods that test hypotheses with larger and more varied samples, as well as involving comparisons between schools with different contexts. With more in-depth and comprehensive results, more appropriate policies regarding the integration of technology in education can be formulated.

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