JOURNAL OF INTERDISCIPLINARY PERSPECTIVES

ISSN Print: 2984-8288, ISSN Online: 2984-8385
Vol. 4 No. 4, pp. 133-142, April 2026

Original Article

Hataraku Saibō: Anime-Assisted Instruction on Students' Performance in Immunology

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Article History:

Date received: January 1, 2026
Date revised: March 2, 2026
Date accepted: March 11, 2026

Recommended citation:

Amodia, L., Paris, P.E., & Tolones, A. (2026). *Hataraku Saibō:* Anime-assisted instruction on students' performance in Immunology. *Journal of Interdisciplinary Perspectives*, *4*(4), 133-142.
https://doi.org/10.69569/jip.2026.002

Abstract. The research addressed persistent challenges in Philippine science education, specifically complex concepts in Immunology, particularly low achievement and learning loss following the COVID-19 pandemic, by integrating the educational anime Hataraku Saibō (Cells at Work!) into classroom instruction. This study aimed to determine whether anime-assisted instruction improves students' performance compared with traditional teaching methods. A quasi-experimental design was used involving 60 students, divided into an experimental group (n = 30) and a control group (n = 30). Results showed that both groups improved after instruction; however, the anime-assisted group achieved significantly higher post-test scores than the control group (p = 0.048), with a medium effect size, as measured by Cohen's d. Qualitative findings revealed increased engagement, improved conceptual understanding, and enhanced motivation. The study concludes that anime-assisted instruction can effectively enhance student performance and interest in immunology, suggesting its potential value as a supplementary teaching strategy in science education and supporting the integration of entertainment media into formal curricula to foster more engaging and meaningful learning experiences.

Keywords: *Science education; Anime; Video; Immunology.*

Science and technology play a pivotal role in advancing societies by driving innovation, solving global challenges, and improving human welfare. Despite the widespread availability of scientific information online, gaps in science literacy remain evident. The 2016 National Science Foundation report highlighted significant knowledge deficiencies in the general population, underscoring the need for quality science education aligned with Sustainable Development Goal 4, which promotes inclusive and equitable learning (UNESCO, 2017). These concerns are particularly pressing in higher education, where students are expected to master complex scientific concepts essential to their professional preparation.

One area that continues to challenge learners is immunology. As a highly complex and interdisciplinary field,

immunology requires students to integrate abstract concepts across multiple biological systems (Siani et al., 2020; Stranford et al., 2020). For first-year nursing students, immunology is introduced under Microbiology and Parasitology, where foundational understanding is critical for future clinical practice. However, students often struggle with its multi-level processes and technical terminology (Porter et al., 2021). This highlights a clear instructional problem: how can complex immunological concepts be made more accessible and meaningful to beginning learners?

The COVID-19 pandemic further reshaped educational practices, accelerating the integration of digital tools in instruction (Stoian et al., 2022). Although face-to-face classes have resumed, the call to "reimagine education" remains, encouraging educators to retain effective digital strategies that enhance engagement and understanding. Research indicates that learning outcomes between online and traditional modalities do not differ significantly, suggesting that instruction's effectiveness depends more on teaching strategies than on delivery mode. Therefore, identifying innovative and engaging strategies is essential for improving science learning outcomes.

Recent approaches in science education have explored multimedia, storytelling, and popular culture to enhance student engagement. Storytelling helps learners connect new information to prior knowledge, improving comprehension and retention (Csikar et al., 2018). Similarly, video-assisted instruction has been associated with improved engagement and performance when effectively integrated into lessons (Domingo & Bradley, 2018). However, while these studies demonstrate the benefits of multimedia in general science education, limited research specifically examines their application in immunology instruction, particularly within the Philippine higher education context.

In the Philippines, anime has been widely popular since the early 2000s and remains highly relevant among Generation Z learners. Educational anime such as *Hataraku Saibō* (*Cells at Work!*) presents complex biological processes through animated storytelling and scientifically grounded narratives. Its visual and narrative format offers potential for simplifying abstract immunological mechanisms. Despite its popularity and apparent educational value, there is limited empirical evidence examining its effectiveness as a supplemental instructional tool in college-level immunology courses.

Established learning theories may support the use of anime-assisted instruction. The Cognitive Theory of Multimedia Learning explains that students learn more effectively when information is presented through both visual and auditory channels, provided that cognitive overload is minimized. Anime integrates narration, dialogue, and visual representation, which may help learners organize and integrate complex immunological concepts. Additionally, the Theory of Multiple Intelligences suggests that varied presentation formats can support diverse learning strengths, potentially increasing engagement and comprehension among students. These theoretical perspectives provide a foundation for examining anime as an instructional strategy in immunology.

Given the persistent challenges in teaching immunology, the growing integration of multimedia in education, and the cultural relevance of anime in the Philippine context, there remains a need to determine whether anime-assisted instruction can meaningfully enhance student learning empirically. Therefore, this study aimed to investigate the effectiveness of *Hataraku Saibō* (*Cells at Work!*) as a supplemental instructional tool for first-year nursing students in learning immunology. By exploring its impact on student performance, the study seeks to contribute evidence-based insights into innovative strategies that combine engagement with academic rigor in science education.

Methodology

Research Design

To attain the objective of this study, a quasi-experimental pretest–posttest control group design was used. This design was selected because the participants were enrolled in intact class sections, and institutional scheduling policies made random reassignment of individual students to groups impossible. Therefore, true experimental randomization could not be applied. According to Fraenkel and Wallen (2009), a quasi-experimental design is appropriate when random assignment is not feasible, particularly in educational settings where intact classes are commonly used. Moreover, it is consistent with Grosskopf, Hayes, & Taylor (2014), as it is widely applied in educational research because it allows researchers to evaluate the impact of an instructional intervention while maintaining the natural classroom environment. The design enabled comparison of the effects of anime-assisted instruction and non-anime-assisted instruction on student performance while minimizing classroom disruption.

The pretest and posttest design with a control group is a widely used quasi- experimental design. In this design, the researcher selects a group to receive the treatment and another with similar characteristics to serve as the control group (Alessandri, Zuffianò, & Perinelli, 2017).

The study involved two groups: one group received anime-assisted instruction, while the control group received traditional instruction without video assistance. Both groups completed a pretest to establish baseline equivalence and a post-test after the intervention to measure learning gains. Although individual students were not randomly assigned, the two intact classes were matched based on sex and pretest scores to reduce selection bias and help control for confounding variables. This strengthened internal validity by ensuring that the groups were comparable prior to the intervention. Thus, the quasi-experimental pretest–posttest design was the most appropriate and ethical approach for this study because randomization at the individual level was not possible, intact classes had to be maintained, and the design still allowed meaningful comparison of learning outcomes between the two instructional approaches.

Participants

The study involved 60 first-year nursing students enrolled in Microbiology and Parasitology (BSci 106) from the College of Nursing and Nutrition and Dietetics. Two sections participated: 1A (n=30) and 1B (n=30), each consisting of 7 males and 23 females. The groups were comparable in terms of sex and academic performance.

Research Instrument

The study utilized two primary research instruments to collect data: a researcher-made pre-posttest and a semi-structured interview guide. The Researcher-made Test consisted of a 60-item multiple-choice assessment designed using a Table of Specifications (TOS) to ensure alignment with learning competencies. The TOS format used in this study followed the official school template, ensuring standardization and consistency with institutional assessment practice**s.** The TOS distributed items across the cognitive domains of remembering, understanding, applying, and analyzing, and across the three major immunology topics: immune defenses, types of immunity, and hypersensitivity. This ensured balanced representation of content areas and thinking skills. Item difficulty and discrimination indices were examined during pilot testing, and poorly performing items were revised or removed before final administration. To ensure validity, the test was reviewed by three experts in biology and pedagogy who evaluated its content and construction. Following a pilot test to eliminate ambiguous items, the instrument's reliability was statistically analyzed using the Kuder-Richardson Formula 20 (20 20) and SPSS. It achieved an acceptable level of internal consistency for measuring student performance before and after the intervention.

A semi-structured interview guide was used to elicit students' experiences with learning through the integration of anime videos into the concept of the immune system. The interview consisted of ten (10) participants who were randomly selected. To maintain confidentiality and safeguard participants' identities, the researcher used pseudonyms when presenting the narrative analysis of the qualitative data. The students used their phones for the interview. The pseudonyms used were the first 10 numbers in Japanese: Ichi, Ni, San, Shi, Go, Roku, Shichi, Hachi, Kyuu, and Juu.

Data Gathering Procedure

The initial phase focused on administrative clearance and instrument validation. The researcher secured permission from the University President and obtained ethical clearance from the Center for Educational and Institutional Research (CEIR). Following this, approval was sought from the College of Nursing and Dietetics (CNND) for pilot testing, which was conducted online via Google Forms with first-year nursing students. During this stage, the researcher also coordinated with the Department of Biology and prepared a matched-pairs design, in which participants were grouped by sex and pre-test scores to ensure baseline equivalence between the experimental and control groups.

The intervention took place over three weeks (January to March), with each session lasting 1.5 hours. The researcher-made tests were administered to the two (2) sections of first-year nursing students currently enrolled in the subject. After the test, the scores were sorted and matched-pairs by score and sex. A lesson guide was created to ensure a structured flow for each lesson. Both groups followed identical lesson guides, with the only difference being the supplementary anime videos provided to the experimental group. The experimental group received instruction with anime assistance, while the control group received instruction without it. These plans were

developed and presented side by side. The intervention for the control group (non-anime-assisted instruction) was done once a week, from 10:00-11:30 AM, while the experimental group (anime-assisted instruction) was done once a week, from 8:30 AM - 10:00 AM. Each group received individual instructions from the researcher prior to the treatment sessions. The intervention lasted three weeks from January to March, starting with the pre-test for two groups. After obtaining the scores, the researcher used a match-only pretest-posttest design to match students' performance scores before the intervention across groups. Participants were matched from one group to another based on sex and pre-test scores. The researcher in this study focuses on understanding the impact of an intervention in a teaching environment, particularly in biology classes. The length of the intervention stage was carefully considered, with classes lasting 1.5 hours per week for three weeks. The research involves two groups of participants who were subjected to a 60-item pre-test. The topic in immunology was divided into three sessions: (1) Overview of Immune cells and Three lines of Defenses; (2) Types of Immunity (Innate and Adaptive Immunity and Humoral and Cell-Mediated Immunity); (3) Active and Passive Immunity and Hypersensitivity. A notable aspect of this study is the use of specific video clips on selected biology topics, explicitly associated with biological concepts. These video clips were matched to corresponding content standards, providing a structured and targeted approach to the intervention. The flow of the lesson can be seen in the lesson guide, and video clips can be found in the motivation, the lesson proper, or the closure. Each group's progress was closely monitored through various assessment methods, including recitations and formative assessments. This multi-faceted approach ensures a comprehensive evaluation of the participants' understanding and retention of the biological concepts introduced during the intervention.

In the final phase, the same 60-item multiple-choice test was administered via Google Forms after the last session. The data scores were compiled and organized in an Excel spreadsheet to facilitate collection and subsequent analysis. Lastly, ten (10) students were interviewed to share their experiences in anime-assisted instruction through phone interviews and analyzed through narrative analysis.

Data Analysis Procedure

Data from the study were processed using SPSS 2023 software, employing a combination of descriptive and inferential statistics to evaluate student performance. Descriptive statistics, including the mean and standard deviation, were used to assess the students' performance levels and the homogeneity of their scores both before and after the intervention. For inferential analysis, the study used an independent-samples t-test to compare performance between the two groups and a paired-samples t-test to assess significant progress within each group after the intervention, with all tests set at a 0.05 level of significance. Additionally, Cohen's d was calculated to measure the effect size of the anime-assisted instruction.

Qualitative insights were derived through narrative analysis, where data from open-ended questionnaires and interviews were transcribed, coded, and categorized to identify common themes regarding student experiences. The students' experiences were gathered through interviews conducted with the experimental group. After the quantitative data had been collected, analyzed, and discussed, the researcher formulated a set of qualitative questions to complement and further elaborate on the findings from the quantitative phase. The qualitative analysis examined students' experiences with the integration of anime into immunology lessons. Pseudonyms were used to ensure anonymity. The interviews were conducted using a mobile phone, and the transcripts were transferred into a spreadsheet for ease of coding and organization. The responses from the open-ended questionnaire were transcribed and analyzed. The data were then subjected to Thematic Narrative Analysis as described by Riessman (2008), which focuses on what participants say rather than how the story is told. This process involved repeated reading of the transcripts, coding meaningful statements, and grouping these into categories that reflected recurring ideas and shared meanings across respondents. These categories represented the common experiences narrated by the students regarding anime-assisted instruction.

Ethical Considerations

Prior to the commencement of the study, the research proposal was submitted to the Center for Educational and Institutional Research (CEIR) of the university for comprehensive evaluation. Upon rigorous review, the center issued formal clearance to proceed with administering the instruments. Participants from both groups were then provided with an informed consent letter, and the researcher explained all procedures in detail to ensure that participation was entirely voluntary. To uphold the highest ethical standards, strict adherence to the Data Privacy Act of 2012 (Republic Act No. 10173) was maintained to safeguard the confidentiality of all participant data. By signing the consent form, participants were assured that their data would be treated with the utmost care to protect

their privacy and rights. The researcher guaranteed that participation would pose no risk of harm and that anonymity would be strictly maintained by excluding identifiable information from the final report. While the findings of this study may be shared or published for academic purposes, all participant identities will remain undisclosed and protected under the full extent of the law.

Results and Discussion

Descriptive Data Analyses

The study established a baseline by evaluating the initial knowledge of both the experimental and control groups. The mean score showed students' performance levels before and after the intervention. Standard deviations were used to assess the degree of homogeneity or heterogeneity among participants. Moreover, the participants answered a sixty (60) item multiple-choice test for Immunology.

Table 1. *Pre-test and Post-test Mean Scores of Experimental and Control Groups*

Group	N	SD	Mean	Description
Pre-test				
Experimental	30	6.53	29.96	Below Average
Control	30	6.64	29.47	Below Average
Post-test				
Experimental	30	9.03	41.70	Above Average
Control	30	10.37	36.63	Average

Note. Students' Performance: Below 30.00 – Poor; 30-34.99 – Below Average; 35-39.99 – Average; 40-44.99 – Above Average; 45-above – Excellent

The pre-test results indicate that both groups began the study with comparable levels of prior knowledge in immunology. Their similar performance and score dispersion suggest that the two groups were relatively homogeneous before the intervention, establishing a fair basis for comparison. This baseline equivalence strengthens the validity of the findings, as subsequent performance differences can be more confidently attributed to the instructional approach rather than to pre-existing ability differences.

Following the intervention, both groups demonstrated improvement, indicating that instruction in general positively influenced students' understanding of immunology concepts. However, the group exposed to anime-assisted instruction achieved higher performance and was classified as "above average," while the control group remained within the "average" range. This difference suggests that integrating anime as a supplemental instructional tool may have enhanced comprehension beyond that achieved with non-anime-assisted methods. The relatively more consistent performance within the anime-assisted group further implies that the strategy may have supported a broader range of learners. By presenting complex immunological processes through visual narratives and structured storytelling, anime may have helped students better organize abstract concepts and sustain attention. This aligns with research suggesting that well-designed video-based learning materials can enhance engagement and facilitate deeper understanding (Brame, 2016).

At the same time, studies caution that prolonged or poorly structured video exposure may reduce retention due to mind wandering (Risko et al., 2012). Effective implementation, such as keeping videos concise and aligned with instructional objectives, is therefore essential to maximize learning benefits (Guo et al., 2014). In this study, the improved outcomes of the anime-assisted group indicate that when multimedia materials are purposefully integrated, they can serve as an effective supplement to traditional instruction.

Overall, the findings suggest that anime-assisted instruction not only improved student performance in immunology but also demonstrated potential as an engaging and academically sound strategy for teaching complex scientific concepts.

Inferential Data Analyses

The results indicate that both instructional approaches led to statistically significant improvements in students' immunology performance. This confirms that structured instruction—regardless of method—can effectively enhance students' understanding of complex scientific concepts. However, the magnitude of improvement differed between groups, suggesting that the type of instructional strategy used plays an important role in learning outcomes. Students exposed to anime-assisted instruction demonstrated greater academic gains compared to those who received non-anime-assisted instruction. This finding suggests that integrating anime into immunology

lessons may have provided additional cognitive and motivational benefits beyond traditional approaches. The narrative structure, visual representation of abstract processes, and familiar cultural context may have helped students better organize information and sustain attention, leading to deeper conceptual understanding.

Table 2. *t-Test Results on the Difference in the Pre-test and Post-test Mean Scores of Students Performance on Immunology Between the Experimental and Control Groups*

Group	Mean	df	t-value	p
Experimental				
Pre-test	29.60	29	+7.18*	.000
Post-test	41.70			
Control				
Pre-test	29.47	29	3.95*	.000
Post-test	36.63			

*$p<0.001$

Research supports the idea that incorporating elements of popular culture, such as anime, can create meaningful learning anchors that connect academic content to students' interests (Ryu et al., 2020). When learners perceive instructional materials as relevant and engaging, they are more likely to invest effort and maintain focus. Furthermore, video-based instruction has been shown to foster both cognitive and emotional engagement, thereby enhancing motivation and facilitating learning (Rongbutsri et al., 2023). The emotional resonance of animated storytelling may help students internalize complex immunological mechanisms more effectively than text-based explanations alone. Multimedia learning research also suggests that visual and verbal information are processed through different cognitive channels, and meaningful integration of these channels can strengthen comprehension (Raiyn, 2016). By combining dialogue, imagery, and scientific explanation, anime-assisted instruction may have optimized this dual processing, thereby contributing to the stronger academic gains observed.

Overall, the findings highlight that while both methods were effective, anime-assisted instruction appears to offer added value in improving student performance in immunology. This underscores the importance of thoughtfully integrating engaging multimedia tools to support deeper and more sustained learning in science education.

Table 3. *t-Test Results on the Difference in the Post-test Mean Scores in Students' Performance in Immunology Between the Experimental and Control Groups*

Group	Mean	df	t-value	p	d
Experimental	41.70	29	+2.02*	.048	0.52
Control	36.63				

**$p<0.001$

The results demonstrate that students who experienced anime-assisted instruction outperformed those who received non-anime-assisted instruction in the post-test. This difference suggests that the use of anime was not merely engaging but contributed meaningfully to students' understanding of immunology concepts. The presence of a medium effect indicates that the instructional approach had practical educational value, not just statistical significance. This finding is important because it highlights the added benefit of integrating structured multimedia tools into science instruction. Anime-assisted learning likely enhanced comprehension by presenting complex immunological processes through coordinated visual and verbal explanations.

Such integration supports meaningful learning by helping students focus their attention, organize information logically, and connect new knowledge with prior understanding. Rather than relying solely on traditional explanations, the animated narratives may have reduced abstraction and made microscopic processes more concrete and memorable. The results also suggest that aligning instruction with students' interests and cultural familiarity can positively influence academic performance. By incorporating elements of popular culture, the instructional strategy may have increased motivation and sustained engagement, both of which are critical for mastering challenging scientific content. When students are emotionally and cognitively engaged, they are more likely to invest effort in processing information deeply.

Overall, the findings indicate that anime-assisted instruction offers more than novelty; it represents a pedagogically sound strategy that can enhance learning outcomes in complex subjects such as immunology. This underscores the value of thoughtfully integrating culturally relevant multimedia tools into higher-education science courses to promote deeper, more meaningful learning.

Qualitative Analysis

The qualitative analysis examined students' experiences integrating anime into immunology lessons. Pseudonyms were used for anonymity. The interview was conducted using a mobile phone. The transcripts were transferred to a spreadsheet for easy categorization. There are five themes: Engagement and Interest, Appreciating lessons through visual storytelling, Enhancing understanding through creative representation, Personal relatability, and Interactive Classroom.

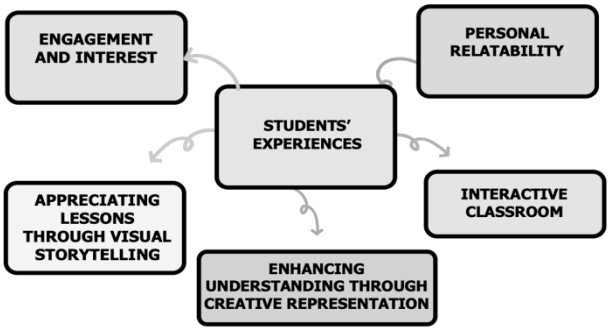

Figure 1. *Graphic Organizer on the Students' Experiences in Anime-Assisted Instruction in Learning Immunology*

Engagement and Interest

Roku and *Go's* initial reaction was excitement and interest at the prospect of integrating anime into their lessons. Most are already familiar with the word "anime," and some are familiar with "Cells at Work!". *Juu* mentioned she had already watched the anime (Cells at Work!) and was excited that the anime she had watched could relate to her lesson for that day. Meanwhile, *Kyuu* mentioned that this kind of teaching strategy is unique and new, which made it interesting. Despite the concept's complexity, which requires many connections across biological systems, as stated by (Stranford et al., 2020) and corroborated by (Porter, E., et., 2021) which posed a challenge to both students and teachers in the field of immunology but with enhanced engagement and interest with this learning tool this will further enhance the teaching and learning process. *Ni* and *Kyuu* also highlighted in their answers that anime videos were a fun and interesting learning experience, since they are not as boring to watch as usual ones. In general, the integration of anime into science education elicited positive reactions from students and aligned with existing research findings. Ryu et al. (2020) found that incorporating anime into educational settings was perceived as "very interesting" by students, reflecting a growing acceptance of unconventional teaching methods. These findings are consistent with previous research suggesting that digital teaching tools can enhance student engagement (Stoian et al., 2022). Moreover, Mayer et al.'s (2015) E-learning theory posits that technology, when effectively integrated, can increase engagement and interest of learners by presenting content in a way that aligns with students' digital literacy and experiences.

Appreciating Lessons Through Visual Storytelling

Go and *Ichi* highlighted the value of visual representation in anime as a factor in enhancing their understanding and retention of scientific concepts. This helped them remember and retain scientific information, which is better than the traditional approach. *Shi* noted that the anime "Cells at Work!" is an engaging educational tool that promotes active learning and understanding through compelling visuals. The anime illustrates the importance of each cell's function. *Shichi* stated that anime's unique storytelling, visual elements, and characterizations can make complex topics more relatable and memorable. Finally, *Ni* believed that anime in class is more creative and interesting to learn because of its graphics and visuals. The visual depiction of anime was one of its advantages in engaging students' attention toward the lesson. The fusion of entertainment and education has reached new heights by incorporating "Cells at Work!" into the science curriculum. Digital and video-assisted lessons, using visual storytelling, offer promising avenues for enhancing student learning, with research consistently showing improved engagement and performance when technology is effectively integrated (Domingo & Bradley, 2018). This was further supported by Arellano (2020), anime as an educational material that can increase engagement and understanding in science education. This is also anchored in Mayer's (2009) theory, which posits that multimedia learning is effective because, through videos and storytelling, students use their different channels. Moreover, Ryu et al. (2020) found that Japanese animation is a distinctive genre that people worldwide enjoy; it is less frequently used than other visual media to enhance instructional content. Participants appreciated the visual

nature of anime, particularly its portrayal of the immune cells or cellular function in the human body. In general, students perceived videos as a resource that helped them understand the lesson easily because the language and explanations were more straightforward and more visual than in text documents (Perez-Navarro et al., 2021). In connection with Gardner's (2017) Theory of Multiple Intelligences, further supports the use of anime, suggesting that presenting concepts through audiovisual, sound effects, and spatial media addresses diverse learning styles, making science more accessible to all students.

Enhancing Understanding Through Creative Representation

Roku and *Juu* mentioned that anime offers a creative and engaging way to learn science concepts through storytelling. *San* recalled a scene featuring white blood cells as heroes. Before exposure to the anime, San held a common misconception that white blood cells and antibodies conflicted. However, the anime illuminated for San that these cells work harmoniously to protect the body from foreign materials that enter it. *Roku* added a particular segment of anime depicting the invasion of the body by foreign microorganisms. This anime portrayal helped *Roku* grasp the body's systemic response to invaders, enhancing understanding and appreciation of its defense mechanisms. Similarly, *Ni* pointed out the distinctive personalities and functions of the main characters in anime, which serve as effective visual aids for grasping complex information. *Hachi* supported him, expressing his amazement at the role of immune cells in protecting the body from microorganisms, particularly in terms of their function during times of vulnerability, such as when one has an open wound. These narratives, punctuated by memorable characters, stirred emotions and forged connections with the content. By integrating educational elements into compelling narratives, anime makes complex topics more accessible and engaging. Effective storytelling has been recognized as an effective way to connect new information with existing knowledge through creative presentation, such as anime-assisted video lessons, making lessons more engaging and memorable (Csikar et al., 2018). This was consistent with Huss (2023), who found that Generation Z learners are digital natives who interact with technology, making video-based tools a natural fit for science classrooms. This approach aligns with Mayer's Cognitive Load Theory (2015), which emphasizes the importance of personalization and embodiment in multimedia learning. According to Abdulrahaman et al. (2020), multimedia designed for learning refers to the process of building mental representation from words and pictures in different contexts. Anime like "Cells at Work" exemplifies these principles, using a controversial dialogue style and human-like gestures to prevent cognitive overload and foster deeper learning experiences. Thus, anime is a source of entertainment and a powerful educational tool, bridging gaps in understanding and enriching knowledge through storytelling. Personal stories or narratives that resonate with learners create a sense of connection. By presenting scientific concepts in a relatable and visually appealing manner, anime may overcome traditional educational methods. They are making it a powerful tool for enhancing understanding, fostering curiosity, and sparking interest in the fascinating world of science.

Personal Relatability

When students watch anime to learn, they get interested and excited. They talked a lot, not just about the story but also about the tricky science shown. The anime made challenging ideas easy to understand and fun to learn by connecting them to real-life situations. *Juu* said they felt like they were white blood cells in the anime because they had a responsibility to help their classmates as a student leader, just as white blood cells protect our bodies. The videos were not just for learning. They also made the subject more interesting. Students talked about cool scenes, like when a cell detected cancer faster than others. These scenes helped them see real-life examples of what they were learning. The teacher-researcher noticed that when students discussed the anime, they understood the science concepts behind it. This shows that using videos makes learning more engaging (Cruse, 2017). This was also supported by Rongbutsri et. al. (2023), who state that video content establishes emotional bonds and can significantly amplify motivation and emotional learning. Therefore, by incorporating elements of anime culture into educational videos, teachers can harness this emotional bond, thereby increasing student engagement and fostering deeper learning experiences.

Interactive Classroom

The classroom became an interactive, active-learning environment for the students. All of them were curious about how those immune cells protect the body from foreign materials that enter the body. Participants shared their favorite scenes from the anime, indicating that the concepts are retained. In the paper Taja-on (2021), watching anime could affect learning additional information, regardless of how frequently they watch anime. One participant, *Kyuu,* said the anime helped them understand how white blood cells protect our bodies from germs. They found it easy to grasp because the anime clearly and interestingly presented the concepts. *Shichi* pointed out

that anime helped her retain scientific information better than the traditional method. They also added that thought-provoking questions helped them think critically and understand the topic well. A study by Szpunar et al. (2013) revealed that students who responded to questions put within video lectures scored higher on subsequent tests and experienced less distraction from their thoughts. In general, videos are an effective way to enrich students' experiences and perceptions of the subject. This way, it will spark discussions, supplement key concepts, provide real-life examples, demonstrate problem-solving, or bring in the views of outside experts. This aligns with Sustainable Development Goal 4, which aims to ensure inclusive, high-quality education for all (UNESCO, 2017). This promotes inclusive and equitable quality education, which can be interpreted to support student-centered learning, ensuring that education systems meet the needs of all learners, including those from marginalized groups.

Summary

Integrating anime, particularly "*Cells at Work!* into science instruction received positive feedback from students and is consistent with previous research findings. An essay titled "*Emergence of Anime in the Philippine*s" (2024) noted that the growing popularity of anime in the Philippines has clearly influenced Filipino communities by fostering shared interests and even inspiring changes in local programs. Given its popularity and positive impact on learners, using anime as a teaching tool is both timely and appropriate. In this study, students showed significant improvement in their performance when anime-assisted instruction was used in learning immunology, indicating that the strategy was effective. Many students also agreed that the anime format was more visually engaging and entertaining than traditional teaching methods.

Overall, students enjoyed and learned from this approach. The combination of entertainment and education is all right, after all. As *Go* said, "*It made learning fun and entertaining, which made the lesson light and educational.*"

Conclusion

The findings of this study conclude that Anime-assisted instruction underscores the efficacy in facilitating students' understanding of immunology concepts. The data, both in scores and interviews, show that this novel approach or strategy needs further exploration. This gives students a positive learning experience with complex concepts such as Immunology. Through storytelling and relatable characters, the anime Hataraku Saibo, or Cells at Work! Effectively bridged the gap between entertainment and education.

The findings of this study support learning theories that emphasize the effectiveness of video-based and multimedia instruction in enhancing students' understanding of complex concepts. Anime-assisted instruction, as a form of video-based learning, improves student performance by managing cognitive load, increasing engagement, and catering to multiple intelligences. Its integration into science lessons demonstrates that well-designed educational videos can foster motivation, emotional connection, and deeper comprehension. These results suggest that educators should consider incorporating anime-assisted and other multimedia-rich instructional strategies to address diverse learning needs and promote more effective and engaging learning experiences for contemporary learners.

This study recommends that students engage with educational anime to make learning factual concepts both enjoyable and meaningful. At the same time, teachers integrate relevant anime clips to enhance student engagement and academic performance. Curriculum developers are encouraged to collaborate with animators, educators, and researchers to design curricula that effectively blend entertainment and education. School administrators should support these initiatives by providing training, seminars, and resources on the effective integration of anime into instruction. Lastly, researchers are encouraged to further explore anime-assisted instruction across science concepts, including its benefits and challenges, through both quantitative and qualitative approaches.

Contributions of Authors

Author 1: conceptualization, proposal writing, data gathering, data analysis
Author 2: conceptualization, proposal writing
Author 3: data analysis, data gathering

Funding

Department of Science and Technology - Science Education Institute (DOST-SEI) under Capacity Building Program in Science and Mathematics Education (CBPSME)

Conflict of Interests

No conflict of interest.

Acknowledgment

The researcher sincerely acknowledges the individuals and institutions who directly contributed to the completion of this study. She is deeply grateful to her research adviser for expert guidance, patience, and invaluable insights throughout the research process.

The researcher also gratefully recognizes the financial support provided by the Department of Science and Technology – Science Education Institute (DOST-SEI) through the Capacity Building Program in Science and Mathematics Education, which made this study possible. She likewise extends her appreciation to West Visayas State University – College of Education, Graduate School, and University of San Agustin for their institutional support and for providing the necessary approval and venue for the conduct of this research.

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