ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 18, Issue, 01, pp.36046-36049, January, 2026
DOI: https://doi.org/10.24941/ijcr.50058.01.2026

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

BEYOND THE CLASSROOM: THE PEDAGOGICAL POWER OF DIGITAL PLATFORMS IN HIGHER EDUCATION FOR IMMUNOLOGY LABORATORY PRACTICES

***Dra. María Elena Tejeda Rosales**

Facultad de Estudios Superiores Zaragoza, UNAM

ARTICLE INFO

Article History:
Received 20th October, 2025
Received in revised form
17th November, 2025
Accepted 28th December, 2025
Published online 30th January, 2026

Keywords:
Immunology, Laboratory Practices, Pixton, PowerPoint, Teaching, Learning.

****Corresponding author:***
Dra. María Elena Tejeda Rosales

ABSTRACT

The present study analyzes the impact of using digital tools in the teaching of Immunology at the university level, comparing two types of technological resources. Through a quantitative and longitudinal design, the pedagogical transition of Immunology lectures was evaluated as they evolved from the use of PowerPoint—as a traditional digital presentation tool—toward the active implementation of Pixton for comic creation. The results, validated using Duncan's statistical test, demonstrate that the shift from a linear presentation platform (PowerPoint) to a creative construction platform (Pixton) not only significantly raised academic averages but also optimized the ability of dental students to synthesize and retain complex information.

Citation: Dra. María Elena Tejeda Rosales. 2026. "Beyond the Classroom: The Pedagogical Power of Digital Platforms in Higher Education for Immunology Laboratory Practices". ***International Journal of Current Research, 18, (01), 36046-36049.***

INTRODUCTION

Today, universities are undergoing a major shift thanks to the use of the internet and digital applications. This transformation has not only changed the setting where we study but also allows learning to go far beyond the four walls of a classroom or the contents of a textbook (García-Peñalvo, 2015). As part of this evolution, tools like PowerPoint were the first step in digitizing classes, moving from traditional blackboards to visual presentations. However, modern pedagogy has sought to go beyond static images. Nowadays, new digital platforms function as "gateways" to worlds of information where no barriers exist; in these spaces, students can work together and advance at their own pace, respecting each individual's learning style (Luna Rizo et al., 2021). Currently, these interactive tools are the heart of teaching. Unlike traditional lecture methods, these applications help make classes more engaging and diverse, allow professors to provide faster feedback, and improve communication between students and teachers (Cabero-Almenara et al., 2020). Pixton stands out as a prime example of how an application can surpass traditional presentation tools like PowerPoint. While the use of slides tends to be more passive, Pixton helps students tell stories and represent what they have learned in a creative and profound way (Toro Muñoz, 2021). This article explains how technology and teaching join forces to create new and enjoyable ways of learning, leaving behind the monotony of linear presentations.

How does Pixton work? Unlike traditional drawing methods or static PowerPoint images, Pixton is an online "virtual workshop" that allows for the quick and easy creation of comics. The best part is that no drawing skills are required: the platform offers a vast array of options with characters of different ages, professions, and styles that can be fully customized—from clothing and hairstyles to facial expressions. Additionally, it features a wide variety of settings (such as schools, laboratories, or landscapes) and objects that make the stories feel complete. To bring characters to life, speech bubbles and text boxes are added very simply, allowing for the adjustment of poses and emotions so they express exactly what the student wants to communicate. Its "drag and drop" design is so user-friendly that any student or teacher can use it with ease (Toro Muñoz, 2021). Pixton is a tool of great educational value because, unlike PowerPoint where the student only observes, here the student develops their mind, creativity, and motivation by becoming a creator. By using it, students imagine stories and dialogues that demonstrate how well they have understood a topic, expressing themselves with words and images simultaneously. This combination makes the information more meaningful and ensures it stays with them much longer (Toro Muñoz, 2021). The utility of this tool, compared to common slide presentations, is summarized in the following benefits:

Visual Organization**:** Unlike PowerPoint filled with text that can be boring, Pixton turns complicated information into a comic. This forces the student to organize their ideas visually and with a logical order. By combining images with a story, it is much easier to understand difficult topics and remember them for a longer time (Mayer, 2009). Clearer Communication**:** Traditional slides often contain too much writing. With Pixton, students learn to be brief and clear so that the message fits within the speech bubbles. Additionally, they use character gestures to transmit ideas, which greatly improves their communication skills (Mayer, 2009). Critical Thinking**:** To create a comic, a student cannot simply "copy and paste." They must analyze the topic, choose the most important points, and assemble a story that makes sense. This "summarize and design" exercise improves their capacity for analysis and problem-solving (Hattie et al., 2024).

Better Teamwork: While PowerPoint is sometimes done individually, this platform invites group work. Students divide tasks and share ideas to create a story together. As a creative and game-like activity, they feel more motivated and participate much more in class (Hattie et al., 2024).

Digital Skills: By using Pixton, students learn to handle modern design tools not found in basic programs. This better prepares them to use technology in their professional lives (Toro Muñoz, 2021).

METHODOLOGY

This study was conducted using a quantitative approach, meaning we focused on measuring results through numerical data. To collect the information, we used questionnaires based on the Likert scale and ensured the reliability of the responses through a calculation called Cronbach's alpha. Both methods are highly respected and widely used in educational research.

Measurement Instruments

Likert Scale This is one of the most common tools for understanding people's thoughts or feelings. Created by Rensis Likert in 1932, it serves to measure opinions or attitudes through a series of statements (Hammond, 2020). Instead of simply answering "yes" or "no," students choose from several ordered options, such as:

- Stronglydisagree.
- Disagree.
- Neither agreenordisagree.
- Agree.
- Stronglyagree.

A number is assigned to each of these options, allowing us to analyze the responses statistically.

Cronbach's Alpha This is a mathematical indicator used to determine if a questionnaire is well-designed and reliable. Its function is to verify that all questions in a section are consistently measuring the same variable (Cronbach, 1951). If the Cronbach's alpha value is high, it means the questions in the exam or survey relate well to each other and the results obtained are consistent and trustworthy.

Study Groups

To ensure a fair study, we compared two very similar groups of students:

Comparison Groups (PowerPoint Era): Data was reviewed from students in the 2020, 2021, and 2022 cohorts. During theseyears, classesweretaughttraditionallyusing PowerPoint.

Study Groups (Pixton Era): Results were analyzed from students in 2023, 2024, and the first semester of 2025, who utilized the comic platform. In total, approximately 40 students per year participated in the Immunology Laboratory Practices. Including all students who have used Pixton to date, we have a total of 160 students. Since the number of students in each group was very similar (with variations of 35, 40, 32, 31, and 33 students), we were able to perform a very robust statistical comparison. This allowed us to confirm with certainty the extent to which learning improved by switching from PowerPoint to Pixton.

Study Procedures

- **The Traditional Method:** The use of PowerPoint during the years 2020, 2021, and 2022.
- **The Innovative Method:** The use of Pixton during 2023, 2024, and the first semester of 2025.

What we measured (our variable) were the final grades obtained by the students in each of these school periods within the Immunology Laboratory Practices course.

Data Processing

- All grading information was organized and stored in an Excel spreadsheet.
- To process the data, we used a computer with a Windows 10 operating system, an Intel Core i7 processor, and 12 GB of RAM, ensuring fast and precise calculations.
- The final calculations to identify the differences between the use of PowerPoint and Pixton were performed using the professional software SPSS Statistics (Ferrán, 2001).

This analysis allowed us to confirm, through numbers, if the switch from PowerPoint to Pixton truly made a positive difference in student learning.

Statistical Hypotheses: Working hypotheses were formulated according to the probabilistic foundations of statistical hypothesis testing, developed in the early 20th century by Egon Pearson and Jerzy Neyman (Neyman & Pearson, 1933). In this study, the Type I error (α) is controlled, and all test statistics have a 95% confidence level. To evaluate the mentioned characteristics, the corresponding hypotheses, test statistics, and decision rules are established to conclude based on validity criteria.

The rejection or non-rejection of the working hypotheses is carried out through the axiomatic-deductive method:

Null Hypothesis**:** The average grades in the Immunology Laboratory Practices of students who used PowerPoint (2020 to 2022 cohorts) and those who used Pixton (2023 to 2025 cohorts) are equal. This would mean that changing the tool had no effect on student learning.
Alternative Hypothesis**:** There is a significant difference between the averages of the cohorts. This would mean that the use of Pixton generated statistically different (and better) results compared to the traditional use of PowerPoint in Immunology Laboratory Practices. To test the hypothesis, a one-way Analysis of Variance (ANOVA) was employed (Field, 2018). The decision rule is as follows: If the significance level (p-value) of the ANOVA is ≥ 0.05, the null hypothesis (H_0) is not rejected; therefore, the grade averages for the students from the 2020, 2021, 2022, 2023, 2024, and the first semester of 2025 cohorts are statistically similar, indicating that Pixton has not impacted student learning (Field, 2018). If the significance level is < 0.05, H_0 is rejected, meaning that the grade average of at least one cohort is statistically different (Field, 2018). If H_0 is rejected, Duncan's Multiple Range **Test** (Duncan, 1955) is performed. This test helps determine which specific group means are significantly different from one another after the null hypothesis of equal means has been rejected (Duncan, 1955).

RESULTS

Table 1. Grades obtained in the Immunology Laboratory Practices

ID	2020	2021	2022	2023	2024	2025
1	7.19	7.48	7.37	9.44	9.47	9.30
2	7.30	7.08	7.08	9.23	9.27	9.33
3	7.03	7.43	7.30	9.45	9.46	9.20
5	7.35	7.01	7.48	9.35	9.33	9.27
6	7.42	7.11	7.09	9.24	9.30	9.48
7	7.09	7.15	7.26	9.30	9.36	9.41
8	7.22	7.15	7.31	9.31	9.49	9.49
9	7.07	7.15	7.18	9.28	9.35	9.29
10	7.23	7.39	7.10	9.29	9.21	9.38
11	7.26	7.30	7.02	9.35	9.22	9.28
12	7.30	7.09	7.03	9.47	9.27	9.24
13	7.47	7.48	7.40	9.35	9.50	9.27

14	7.15	7.05	7.34	9.40	9.43	9.27
15	7.22	7.06	7.25	9.42	9.31	9.39
16	7.02	7.45	7.13	9.39	9.36	9.23
17	7.33	7.16	7.26	9.45	9.30	9.26
18	7.27	7.09	7.48	9.21	9.38	9.40
19	7.39	7.47	7.45	9.20	9.35	9.27
20	7.30	7.46	7.04	9.39	9.25	9.41
21	7.10	7.02	7.16	9.32	9.48	9.24
22	7.19	7.14	7.41	9.30	9.23	9.48
23	7.18	7.14	7.27	9.46	9.28	9.40
24	7.07	7.40	7.04	9.45	9.37	9.36
25	7.49	7.39	7.10	9.27	9.23	9.47
26	7.00	7.41	7.35	9.47	9.39	9.30
27	7.36	7.39	7.04	9.30	9.42	9.47
28	7.18	7.06	7.43	9.47	9.43	9.39
29	7.31	7.17	7.03	9.23	9.25	9.47
30	7.16	7.16	7.36	9.38	9.20	9.23
31	7.32	7.44	7.24	9.40	9.20	9.25
32	7.06	7.36	7.38	9.36	9.41	9.40
33	7.28	7.39	7.25	9.27	9.41	9.27
34	7.26	7.21	7.01	9.30	9.42	9.39
35	7.05	7.02	7.32	9.45	9.40	9.37
36	7.16	7.25	7.45	9.23	9.31	9.28
37	7.12	7.21	7.38	9.27	9.49	9.32
38	7.11	7.04	7.14	9.47	9.39	9.44
39	7.08	7.46	7.40	9.35	9.37	9.35
40	7.32	7.44	7.40	9.26	9.42	9.28
41	7.09	7.45	7.27	9.21	9.39	9.25
Average	**7.21**	**7.25**	**7.25**	**9.34**	**9.35**	**9.34**

Power Point Period (2020-2022): During these years, grades remained at a stable but lower level, around 7.2. This reflects the outcomes of traditional classes based solely on slide presentations.

Pixton Period (2023-2025): A notable and rapid increase in grades is observed from the moment students began creating comics. The average rose significantly, reaching levels above 9.3.

The following comparative table illustrates how academic performance improved by changing the teaching tool:

Table 2. Comparison of the Learning Impact in Immunology Practices using PowerPoint and Pixton

Feature	**Traditional Stage (2020-2022)**	**Innovative Stage (2023-2025)**
Primary Tool	PowerPoint	Pixton (Digital Comics)
Student Role	Passive (Listening and observing)	Active (Creating and narrating)
Information Format	Linear and text-heavy	Visual, sequential, and creative
Motivation Level	Lower (Can be monotonous)	High (Gamification and play)
Grade Average	7.23	9.34
StatisticalResult	Lower-performinggroup	Significantimprovement

Comparison Results (Duncan's Test): To confirm whether there was a real difference between the teaching methods, we applied a statistical test called Duncan's Multiple Range **Test**. The results divided the cohorts into two completely different groups:

Group 1 (PowerPoint Method): Comprising students from 2020, 2021, and 2022. This group obtained the lowest averages in thestudy. Group 2 (Pixton Method): Comprising students from 2023, 2024, and the first semester of 2025. This group obtained the highest averages.

Analysis of Results

As observed, the grade average of the cohorts that used PowerPoint is much lower compared to those that used Pixton. Since Pixton was introduced in 2023, the data allows us to affirm that this technological shift significantly improved learning in Immunology Laboratory Practice courses. In short, moving away from traditional slide presentations and replacing them with interactive comic creation helped dental students achieve higher grades and gain a better understanding of complex topics.

Power Point: Its Limitations Slides are often overloaded with excessive text and images, which ultimately confuses students. By consistently using the same templates, presentations become unoriginal. Furthermore, too many animations or visual effects can cause the student to lose track of the main topic. Its linear format (one slide after another) can become monotonous, especially when there is a high volume of information to process.

Pixton: Its Benefits Pixton works more effectively because it turns learning into something similar to a game, which significantly increases student motivation. It allows students to create their own stories, sparking their imagination and keeping them engaged. By writing dialogue for the characters, students improve their spelling, grammar, and ability to summarize texts almost without realizing it. The use of sounds and animations makes the class feel more modern and enjoyable. It also encourages students to collaborate on group projects and compete in a healthy way, which enhances the learning process. Additionally, Pixton offers a free version and allows teachers to create personalized characters alongside their students, helping them feel more identified with the content.

CONCLUSION

After reviewing the results and the impact of both tools, we can conclude the following:

Significant Improvement in Performance: There is a clear relationship between the use of Pixton and the improvement in student grades. The group average rose from **7.23** (when PowerPoint was used) to **9.34** (using Pixton). This proves that students learn more effectively with this platform.

Active vs. Passive Learning: While PowerPoint typically functions as a linear presentation where the student only receives information, Pixton is interactive and creative. This prevents students from becoming overwhelmed by text and encourages them to participate more actively.

Motivation and Retention: Pixton succeeds in making students want to learn. By using comics and challenges, learning becomes interesting and durable; it is not something they forget the next day.

Development of Literacy Skills: It is not just about drawings; the use of comics forces students to improve their spelling, grammar, and summarization skills. It serves as a dynamic way to practice reading and writing.

Inclusion and Collaboration: Since it offers a free version and allows for teamwork, it is a tool that includes everyone and fosters a sense of fellowship.

The data confirms that replacing the traditional PowerPoint method with a more active approach like Pixton helps students raise their averages and develop better communication skills.

REFERENCES

Cabero-Almenara, J., Marín-Díaz, V., & Castaño-Garrido, C. (2020). The integration of technologies in university teaching-learning processes: Faculty perceptions. *Revista de Educación a Distancia (RED)*, 20(62). https://doi.org/10.6018/red/62/11

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334.

Duncan, D. B. (1955). Multiple range and multiple F tests. *Biometrics*.

Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). SAGE Publications.

García-Peñalvo, F. J., & Ramírez-Montoya, M. S. (2017). Learning, Innovation, and Competitiveness: The Learning Society. *RED. Revista de Educación a Distancia*, (52), 1–6. https://doi.org/10.6018/red/52

González-Díez, L., Labarga Adán, I., & Pérez Cuadrado, P. (2019). Gamification and game elements in digital native magazines: the case of MARCA Plus. *Revista de Comunicación*, 18(1), 47–68. https://doi.org/10.26441/RC18.1-2019-A3

Hammond, M. (December 3, 2020). *Likert Scale*. Retrieved from HubSpot: https://blog.hubspot.es/service/escala-likert

Hattie, J., Fisher, D., Frey, N., & Almarode, J. T. (2024). *The illustrated guide to visible learning: An introduction to what works best in schools*. Corwin.

Hernández Sampieri, R., Fernández Collado, C., & Baptista Lucio, P. (2014). *Research Methodology* (6th ed.). McGraw-Hill Education.

Kivunja, C. (2015). Creative participation of digital students with Gardner's bodily kinesthetic intelligence to improve their critical thinking. *Creative Education*, 6(6), 660–674. https://doi.org/10.4236/ce.2015.66060

Luna Rizo, M., Ayala Ramírez, S., & Rosas Chávez, P. (Eds.). (2021). *Instructional Design. A key element for innovation in learning: Models and Approaches*. Gedisa.

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511811678

Neyman, J., & Pearson, E. S. (1933). On the problem of the most efficient tests of statistical hypotheses. *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character*, 231(694-706), 289–337. https://doi.org/10.1098/rsta.1933.0009

Toro Muñoz, M. Á. (2021). *Pixton: the best way to create comics* (Educational Technology Observatory, No. 66). National Institute of Educational Technologies and Teacher Training (INTEF). Retrieved from https://intef.es

Triglia, A. (2025, April 20). *Albert Bandura's Social Learning Theory*. Psicología y Mente. https://psicologiaymente.com/social/teoria-de-aprendizaje-social-de-albert-bandura

****