



Category: X Iberoamerican Meeting on Innovation, Research and Good Educational Practices (UNAM)

SHORT COMMUNICATION

New Horizons in Microbiology: Opening Doors with the Use of TICCAD in Education

Nuevos Horizontes en Microbiología: Abriendo Puertas con el Uso de TICCAD en la Enseñanza

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Cite as: Tejeda Rosales E, Gil Ruiz N. New Horizons in Microbiology: Opening Doors with the Use of TICCAD in Education. SCT Proceedings in Interdisciplinary Insights and Innovations. 2025; 3:455. <https://doi.org/10.56294/piii2025455>.

Submitted: 12-10-2024

Reviewed: 06-11-2024

Accepted: 04-01-2025

Published: 05-01-2025

Editor: Emanuel Maldonado 

ABSTRACT

Microbiology, the science that studies microscopic life, has traditionally been taught theoretically. TICCAD, with tools such as Virtual Classroom, Kahoot, Google Sites and Infographics, offer a more dynamic and collaborative approach. These digital resources, fostering teamwork and the development of essential skills for the 21st century, play a fundamental role in opening new horizons in this discipline, especially in the educational field, allowing students to visualize complex microbiological processes in an interactive way, They facilitate the understanding of abstract concepts such as viral replication or biofilm formation and allow to adapt the contents and activities to the individual needs of each student, promoting a more effective and motivating learning. In this proposal, we explored how these tools can transform the teaching of microbiology, making it more attractive and effective.

Keywords: TICCAD, Microbiology, teaching, strategies.

RESUMEN

La microbiología, ciencia que estudia la vida microscópica, ha sido tradicionalmente enseñada de forma teórica. Las TICCAD, con herramientas como Aula Virtual, Kahoot, Google Sites e Infografías, ofrecen un enfoque más dinámico y colaborativo. Estos recursos digitales, fomentan el trabajo en equipo y el desarrollo de habilidades esenciales para el siglo XXI, desempeñan un papel fundamental en la apertura de nuevos horizontes en esta disciplina, especialmente en el ámbito educativo, permitiendo a los estudiantes visualizar procesos microbiológicos complejos de manera interactiva, facilitando la comprensión de conceptos abstractos como la replicación viral o la formación de biopelículas y permiten adaptar los contenidos y actividades a las necesidades individuales de cada estudiante, promoviendo un aprendizaje más efectivo y motivador. En esta propuesta, se exploró cómo estas

herramientas pueden transformar la enseñanza de la microbiología, haciendo que sea más atractiva y efectiva.

Palabras clave: TICCAD, Microbiología, enseñanza, estrategias.

INTRODUCTION

Imagine learning about microorganisms in a fun and collaborative way. Microbiology, a key science to understand the world of microorganisms, can now be explored in a more attractive way thanks to ICTCAD. In this proposal, we present how tools such as Virtual Classroom, Infographics, Google Site and infographics and Padlet, can enhance students' learning, making them protagonists of their own educational process (Area, 2009).

THEORETICAL FRAMEWORK

Virtual Classroom:

Allows the creation of a learning environment adapted to the needs and pace of each student, facilitates interaction between teachers and students through forums, chats, and videoconferences, and offers a wide variety of educational resources such as videos, presentations, simulations, and interactive exercises, encourages teamwork through group projects and the creation of discussion spaces and allows formative and summative evaluations in a flexible and personalized way.

Kahoot:

Transforms the evaluation process into a fun and competitive experience, allows consolidation of knowledge quickly and effectively, encourages the participation of all students in the classroom, and provides instant results on each student's performance (Kahoot, 2024).

Google Sites:

Allows teachers and students to create personalized websites to share information, resources, and projects; facilitates simultaneous editing and updating of content; helps structure and organize information in a clear and accessible way; and allows sharing of research and project results with a wider audience (Google Site, 2024).

Infographics:

Conveys complex information and attractively, allows synthesizing large amounts of information in a single image, facilitates the understanding and retention of knowledge, and makes learning more interesting and engaging.

Padlet:

Allows creating a virtual space where students can share ideas, images, videos and other content, adapts to different content formats (text, images, videos, links), allows organizing information in a visual and attractive way, facilitates collaboration between students and teachers.

Objective

To develop a dynamic and collaborative virtual learning environment that uses ICTCAD to improve the understanding of complex microbiological concepts.

RESULTS AND DISCUSSION

The most accepted application was Kahoot 96.6%, Padlet 92.5%, infographics 90.4%, Google Site with 84.9% and Virtual Classroom 78% (Bernal Torres, 2016).

The application where the most learning was obtained was; Kahoot 93%, Infographics 88.7%, Google Site 80.5% and Virtual Classroom 67.65% (Bernal torres, 2016).

TICCADE	% Acceptance	% Learning
Virtual Classroom	78%	67.65%
Padlet	92.5%	82.2%
Kahoot	96.6%	93%
Google Site	84.9%	80.5%
Infographics	90.4%	88.7%



Acceptance Analysis

Virtual Classroom:

- Acceptance: 78%. The tool is accepted by most students, although there is room for improvement in the user experience.
- Kahoot:
- Acceptance: 96.6%. The tool is highly accepted by students, indicating that they find it attractive, easy to use and useful for learning.
- Padlet;
- Acceptance: 92.5%. The tool is highly accepted by students, indicating that they find it attractive, easy to use and useful for learning.

Google Sites:

- Acceptance: 84.9%. The tool is accepted by most students, although there are some who do not find it as useful or attractive as other tools.
- Infographics:
- Acceptance: 90.4%. The tool is highly accepted by students, indicating that they find it attractive, easy to understand and useful for learning.
- Learning Analysis.
- Virtual Classroom:
- Learning: 67.65%. The tool contributes to student learning, but there are other factors that also influence the achievement of educational objectives.

Kahoot:

- Learning: 93%. The tool is highly effective for student learning, indicating that it helps them understand and retain concepts effectively.
- Google Sites:
- Learning: 80.5%. The tool contributes to student learning, but its effectiveness may vary depending on how it is used.
- Infographics:
- Learning: 88.7%. The tool is highly effective for student learning, indicating that it helps them understand and retain concepts in a visual and attractive way.

It is important to note that these results are only a reference and that the effectiveness of TICCAD tools may vary depending on several factors, such as the educational context, the characteristics of the students and the way in which the tools are implemented (Arista J, 1914).

CONCLUSIONS

To conclude this paper, technology is extremely important to include in education, particularly for developing new skills, considering aspects such as the context and the needs of the group and/or people we work with.

After having carried out the practice work in a professionalizing master's degree, in a pandemic and post-pandemic context, it is found that students give much weight to aspects such as interaction with the contents, as well as constant communication, a situation that supports and motivates their actions within the classroom.

It is also important to think about the development of the teacher for the benefit of the student; that is, it is necessary to think as a training institution in those skills that are necessary for the teacher of the XXI century in an era where content management skills through technological tools are increasingly necessary, not only the management of the discipline.

On the other hand, it is also necessary for teachers to develop the ability to digitally literate their students, that is, to have the ability to bring their students closer to the desired tool so that it has the desired impact on students and on the content they want to convey to them so that the process is as fruitful as possible for both actors.

While these findings are of utmost importance to be able to do much more research and intervention, always thinking that technological tools and applications serve to mediate and guide learning, what has been found and developed allows an opening toward a way of understanding the teaching exercise from a perspective that helps to understand this path.

CONCLUSIONS

Kahoot, Padlet, and Infographics are the most popular and effective tools for learning.

Virtual Classroom and Google Sites require improvements to maximize their impact on learning.

It is recommended that students study how they interact with TICCAD tools, identifying the features and functionalities they use the most and the least.

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FINANCING

None.

CONFLICT OF INTEREST

None.

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