Revista Cientifica Estudiantil MedEs

MedEst|2026 | Vol.6: e513| ISSN: 2789-7567 |RNPS: 2524| OPINION ARTICLE

Beyond the screen: bidirectional communication as a transformative axis of the contemporary virtual classroom

Más allá de la pantalla: la comunicación bidireccional como eje transformador del aula virtual contemporánea

Yasmany Salazar Rodríguez [1] Yaquelín Sánchez Pérez [1],

Doris de la Caridad Herrera Santiesteban [2]

Candelario Manuel Hernández Barroso [2]

[1] Army Military Hospital "Dr. Mario Muñoz Monroy". Order of Carlos J. Finlay. Matanzas, Cuba.

[2] University of Medical Sciences of Matanzas. Faculty of Medical Sciences of Matanzas "Dr. Juan Guiteras Gener". Matanzas, Cuba.

How to cite this article: Salazar Rodríguez Y; Sánchez Pérez Y; Herrera-Santiesteban DdlC; Hernández-Barroso CM. Beyond the screen: bidirectional communication as a transformative axis of the contemporary virtual classroom. MedEst. [Internet]. 2026 [cited access date]; 6:e513. Available in: https://revmedest.sld.cu/index.php/medest/article/view/513

Palabras Clave: Educación virtual; Comunicación bidireccional; Aprendizaje colaborativo; Transformación pedagógica; Educación superior.

Keywords: Virtual education; Bidirectional communication; Collaborative learning; Pedagogical transformation; Higher education.

Corresponding author: yasmanyailen@gmail.com

Received: 25/01/2026

Accepted: 13/03/2026

Published: 15/03/2026

Editor(s) in charge: Karen Oviedo Pérez.

Translator: MSc. Maritza Núñez Arévalo

Layout designer: Carlos Luis Vinageras Hidalgo

RESUMEN

La educación superior contemporánea enfrenta el desafío de trascender la mera transmisión de contenidos digitales hacia modelos que privilegien la interacción genuina entre actores del proceso formativo. El presente artículo de opinión analiza el concepto de aula bidireccional como paradigma educativo que rompe con la lógica unidireccional tradicional, el cual propone una reflexión crítica sobre su implementación en el contexto universitario cubano. Se argumenta que la comunicación sincrónica y la retroalimentación inmediata constituyen pilares fundamentales para garantizar la calidad del aprendizaje en entornos virtuales, más allá de la disponibilidad tecnológica. Los autores sostienen que la verdadera bidireccionalidad implica una resignificación del rol docente y una reconceptualización del estudiante como cocreador del conocimiento, aspectos frecuentemente soslayados en las implementaciones tecnológicas superficiales. Se concluye que el desarrollo de aulas verdaderamente bidireccionales requiere no solo infraestructura tecnológica, sino una transformación pedagógica profunda que priorice el diálogo epistémico y la construcción colectiva del saber.

ABSTRACT

Contemporary higher education faces the challenge of transcending mere digital content transmission toward models that privilege genuine interaction among actors in the training process. This opinion piece analyzes the concept of the bidirectional classroom as an educational paradigm that breaks with the traditional unidirectional logic, and proposes a critical reflection on its implementation in the Cuban university context. It is argued that synchronous communication and immediate feedback constitute fundamental pillars for ensuring learning quality in virtual environments, beyond technological availability. The authors maintain that true bidirectionality implies a resignification of the teaching role and a reconceptualization of the student as a co-creator of knowledge, aspects frequently overlooked in superficial technological implementations. It is concluded that developing truly bidirectional classrooms requires not only technological infrastructure but deep pedagogical transformation that prioritizes epistemic dialogue and collective knowledge construction.

MedEst. 2026| Vol. 6: e513
ISSN: 2789-7567 | RNPS: 2524

The COVID-19 pandemic irreversibly accelerated the incorporation of digital technologies into university educational processes, establishing the virtual classroom as the privileged space for the continuity of teaching. [1] However, this urgent transition revealed a recurring problem: the confusion between digitalization and interactive pedagogy. In numerous experiences, the migration to the virtual environment was limited to the reproduction of traditional expository models, where the student remains a passive receiver of information previously structured by the teacher. [2]

From the perspective of the authors of this article, they consider that this limitation is not merely technological, but epistemological. The bidirectional classroom constitutes, in essence, a theoretical-practical framework that transcends videoconferencing or the use of digital platforms, to configure a space for genuine exchange where knowledge is constructed dialogically. [3]

Therefore, the objective of this article is to critically analyze the concept of the bidirectional classroom and its implications for Cuban higher medical education.

According to Pérez Espinosa et al., [4] "the virtual classroom must have bidirectional communication tools that guarantee synchronized connectivity between tutors and students, thus allowing real-time interaction as a distinctive element of effective online learning."

However, it is observed that in daily practice, reductionist conceptions persist. Many teachers assume that the mere technical possibility for students to write in a chat or turn on their cameras constitutes bidirectionality, and in this sense, it is ignored that true pedagogical interaction involves the co-construction of meanings, the negotiation of senses, and the continuous adaptation of the formative process based on student responses.

It is imperative to distinguish between the technological capacity for two-way communication and the pedagogical principle of bidirectionality. The former is a necessary but insufficient requirement; the latter implies a profound reorganization of power relations in the classroom and the traditional roles of teachers and students. [3,5]

From their experience, the authors have verified that the most sophisticated virtual platforms can reproduce banking models of education if they are not accompanied by a clear pedagogical intention. The virtual classroom is defined as the digital environment where teachers and students share content in real time, address

MedEst. 2026| Vol. 6: e513
ISSN: 2789-7567 | RNPS: 2524

queries, and carry out evaluations, but its effectiveness depends fundamentally on the quality of the interactions generated in that space. (6)

The most frequent error in the implementation of virtual classrooms in our university reality has been prioritizing curricular coverage over the construction of meaning. The teacher becomes a technological manager of content, but rarely a facilitator of collaborative learning processes. This trend is aggravated by the scarcity of specific pedagogical training in e-learning methodologies, which generates a gap between the transformative potential of technologies and their actual use in the classroom. (7)

Specialized literature highlights bidirectional communication as a distinctive characteristic of the virtual classroom compared to other modalities of distance education. (8) However, the authors propose a critical reading of this affirmation: not all synchronous communication guarantees meaningful learning.

In the authors' opinion, the educational value of bidirectionality lies not in temporal simultaneity, but in the ability to generate zones of proximal development (in Vygotskian terms) through dialogue. This demands specific competencies from the teacher: the ability to listen actively, to reformulate questions in real-time, to detect signs of misunderstanding through digital media, and to adapt the didactic strategy according to student responses. (9,10)

Research on bidirectional learning in global contexts suggests that strategies such as debates, frugal innovation exercises, and inquiry-based learning foster dialogic thinking and the consideration of multiple perspectives. These methodologies, adapted to our context, could significantly transform the quality of interaction in our virtual classrooms.

The official rhetoric about the virtual classroom often emphasizes the active role of the student, but institutional practice frequently contradicts this. Flexible scheduling and access to materials in different formats do not by themselves guarantee autonomous and participatory learning. Student autonomy in the bidirectional classroom must be understood as a social construct, not an individual one. The student develops self-regulation and critical thinking capacities when participating in communities of practice where their contributions are valued and where there is a genuine negotiation of content and evaluation procedures.

MedEst. 2026| Vol. 6: e513
ISSN: 2789-7567 | RNPS: 2524

This conception has concrete implications for the design of virtual classrooms. It is not enough to have forums or chat tools; it is necessary to structure activities that require the genuine contribution of students for the collective construction of knowledge. Real-time surveys, moderated debate spaces, and collaborative projects are examples of how technology can serve a participatory pedagogy, provided they are integrated into a coherent didactic strategy. (11)

The combination of synchronous moments (for discussion, resolving doubts, and immediate feedback) with asynchronous activities (for individual deepening and non-simultaneous collaborative work) can be more effective than exclusive dependence on real-time virtual classes. The essential thing is to guarantee that in both modalities there is true bidirectional communication, understood as an exchange of ideas and the co-construction of meanings.

Likewise, the development of bidirectional classrooms in Cuba requires special attention to the pedagogical training of teachers. Technical mastery of the platforms does not replace the understanding of didactic principles that underpin educational interaction. It is necessary to incorporate specific modules on instructional design for virtual environments, pedagogy of dialogue, and technological mediation of learning into professional development programs. (12,13)

Unlike those who see the virtual classroom as a transitory or complementary solution, bidirectionality must be constituted as an organizing principle of all university teaching practice, regardless of the modality (face-to-face, virtual, or hybrid). The pandemic should not be remembered as a period of forced technological adaptation, but as the moment of rupture with obsolete pedagogical models.

The authors do not share the optimistic vision that assumes that the mere availability of digital tools will naturally lead to more participatory education. On the contrary, technology can reproduce and amplify inequalities and authoritarian practices if it is not accompanied by deep pedagogical reflection. The bidirectional classroom requires, ultimately, a democratization of educational relationships.

The bidirectional classroom represents a desirable horizon for Cuban higher education, but its realization requires overcoming the technocratic vision that reduces educational innovation to the adoption of digital platforms. Effective bidirectional communication requires transformations in the conceptions of teachers and students about the teaching-learning process, as well as institutional

conditions that favor pedagogical experimentation and continuous training.

Furthermore, the future of Higher Education lies in the consolidation of virtual spaces where epistemic dialogue, diversity of perspectives, and the co-construction of knowledge are the norm, not the exception. This implies an explicit commitment from institutions to pedagogical quality, beyond quantitative indicators of coverage or technological access.

BIBLIOGRAPHIC REFERENCES

1- Hodges C, Moore S, Lockee B, Trust T, Bond A. The difference between emergency remote teaching and online learning. Educause Review [Internet]. 2020 [cited 19/01/2026]. Available in: https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

2- Sosa L. La virtualidad forzada y la educación médica en épocas de pandemia [Tesis Doctoral]. La Plata: Universidad Nacional de La Plata, Facultad de Ciencias Médicas; 2023 [cited 19/01/2026]. Available in: http://sedici.unlp.edu.ar/handle/10915/157189

3- Corell Domenech M. Una acción pedagógica bidireccional: la segunda enseñanza en el Institut-Escola de la Generalitat y el Seminari de Pedagogia de la Universitat de Barcelona. CIAN. Revista de Historia de las Universidades [Internet]. 2023 [cited 19/01/2026]; 26(1): 176-206. Available in: https://www.torrossa.com/en/resources/an/5522450

4- Pérez Espinosa LM, Bethancourt Enriquez J, Castillo Espino A, Jiménez Suarez B, Rodríguez Rojas M, et al. Propuesta de acciones para la implementación del aula virtual en la Universidad de Ciencias Médicas en Ciego de Ávila [Internet]. En: XI Jornada Científica de la SOCECS; 2022 [cited 19/01/2026]. Available in: https://edumedholguin.sld.cu/index.php/edumedholguin22/2022/paper/download/167/91

5- Abreu RL. Aula virtual en ciencias médicas: potenciando la docencia para la excelencia educativa. Didasc@lia [Internet]. 2024 [cited 19/01/2026]; 15(6), 176-192. Available in: https://dialnet.unirioja.es/servlet/articulo?codigo=10045969

6- Martínez-García I, Alastor E, Sánchez-Vega E, Mondéjar-Rodríguez JJ. Digital divide and digital inclusion in Cuba: a systematic review. En: Tomczyk Ł, Guillén-Gámez FD, Ruiz-Palmero J, Habibi A, editores.

From Digital Divide to Digital Inclusion. Lecture Notes in Educational Technology. Singapore: Springer; [Internet] 2023 [cited 19/01/2026]. Available in: https://doi.org/10.1007/978-981-99-7645-4_8

7- Abreu Vázquez Y, Pérez Mallea I. Estrategia de superación para la mejora del desempeño del docente en el aula virtual de la Facultad de Ciencias Médicas "Julio Trigo López". Serie Científica de la Universidad de las Ciencias Informáticas [Internet]. 2024 [cited 19/01/2026]; 17(11), 76-85. Available in: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2306-24952024001100076&lng=es&tlng=.

8- Grilli Mariano N, Forestieri OA, Uranga A. e-Learning en educación médica. En: Salud de la mujer. Enfoque interdisciplinario de su proceso de atención. La Plata: Universidad Nacional de La Plata; 2022. p. 83-14 [cited 19/01/2026]. Available in: https://sedici.unlp.edu.ar/handle/10915/147611

9- Yépez Mancero V, Franco Alvarado O. Innovación pedagógica en la educación médica: el rol de la interactividad. Rev Cubana Educ Super [Internet]. 2025 [cited 19/01/2026];44(3):416-32. Available in: https://revistas.uh.cu/rces/article/view/11646

10- Robles López N, Wyszengrad MJ, Calvo L, Lospinato N. Recuperando "la transformación socialista del hombre", un texto olvidado de Vigotski [Internet]. En: XVII Congreso Internacional de Investigación y Práctica Profesional en Psicología. XXXII Jornadas de Investigación XXI Encuentro de Investigadores en Psicología del MERCOSUR. VII Encuentro de Investigación de Terapia Ocupacional. VII Encuentro de Musicoterapia. Facultad de Psicología-Universidad de Buenos Aires. [Internet]. 2025 [cited 19/01/2026]. Available in: https://www.aacademica.org/000-004/147

11- Rosado K. Efecto del diseño e incorporación de un aula virtual basada en realidad virtual para la capacitación de docentes en educación superior. Sage Sphere International Journal [Internet]. 2025 [cited 19/01/2026]; 2(1), 3. Available in: https://dialnet.unirioja.es/servlet/articulo?codigo=10176957

12- Salazar-Rodríguez Y, Ruíz-Hernández I, Mondéjar-Rodríguez JJ. Innovación pedagógica en ciencias de la salud: una necesidad urgente. MedEst. [Internet]. 2025 [cited 19/01/2026];5: e443. Available in: https://revmedest.sld.cu/index.php/medest/article/view/443

13- Zhang J, Li C. Bidirectional and longitudinal associations among teacher-student relationships, peer relationships, and learning engagement in Chinese primary school students: a cross-lagged panel model. Front Psychol [Internet]. 2025 [cited 19/01/2026]; 16:1674600 Available in: https://doi.org/10.3389/fpsyg.2025.167600

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FUNDING SOURCE

No funding was received for this work.

USE OF ARTIFICIAL INTELLIGENCE

The authors declare that no artificial intelligence was used in the preparation of this manuscript.