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Google Classroom In A Hybrid Model. Uses And Applications Of Higher Education Teachers

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Abstract
Education became a challenge in times of pandemic and post-pandemic, which is why this article aims to present the design, implementation and evaluation of a transversal course in Google Classroom, initially in the e-learning mode during the pandemic and after this, step to the b-learning mode, as a didactic mediation to support problem solving and scientific thinking in a university program. The experience was designed from design-based research for its implementation and evaluation, which, according to the students' opinion, was positive. The result obtained was the creation of a course that follows a didactic planning that evidences the effectiveness of the Classroom application and its resources to generate interest, motivation, and collaborative learning environments that allow communication and exchange, the availability of resources and the management of evaluative tasks. Some limitations to highlight were that some students did not have access to connectivity and/or technological resources on a continuous basis. It can be concluded that ICT-mediated education is an alternative to provide continuity to the educational process in contingencies such as absence of the teacher and/or students, or in extreme situations such as pandemics, but its design, implementation and development imply more time and work.

Keywords: Google Classroom, mathematics, hybrid model, higher education, higher education.

Introduction

The confinement caused by the pandemic led to the incorporation of ICT-mediated education remotely, as the mechanism that allowed the continuity of the educational process of students, if not as the only means to develop learning. Although education must adapt to advances in technology, as well as to didactic and pedagogical innovations (Hernandez, 2017; Calero, 2019), it must also adapt to unconsidered contingencies such as a pandemic (Avendaño-Castro et al., 2021; Ortega et al., 2021; Ortiz, 2021; Peña et al., 2021), or situations where both teachers and students are absent from face-to-face classes, which represents delays in the teaching and learning process (May et al., 2017).

Since before the pandemic and even more during it, the use of technological tools is common in the educational field, especially in higher education through virtual learning environments (EVEA) supported by virtual platforms such as Moodle, Blackboard, Classroom, Edmodo, Teams, Zoom or Collaborate among others (Delgado & Martínez, 2021; Muñoz, 2022) and after it its use has continued and has become widespread at all educational levels (Torres et al., 2022), but there is still resistance for some teachers to continue their pedagogical practice through the use of technologies, as well as to change the paradigm that the virtual world is only about storing files and that the student must download them (Collantes & Collantes, 2022).

From the beginning of the pandemic, the contents planned from the classroom were worked on by implementing technologies remotely through platforms and applications that allow for synchronous meetings with students. This experience was based on this need to generate a didactic experience for the teaching and learning process in the solution of mathematical and scientific problems (Mariño et al., 2021), which, by its very nature and with the use of the Internet, is a didactic experience for the solution of mathematical and scientific problems (Mariño et al., 2021). The very nature of the pandemic and the psychosocial effects of the pandemic (Gamboa et al., 2020) can cause students to be demotivated, unwilling and even have negative feelings and anxiety about learning (Fernández-Cézar et al., 2020)

Problem-solving can be an individual process, but it is also a collaborative skill because it requires people capable of solving problems together with others (Morales-Cortés, & Tello-Contreras, 2020), especially with mediations with technology (Calle, & Agudelo, 2019; 2021). For this experience, a virtual classroom has been implemented in Google Classroom (classroom.google.com) to strengthen problem-solving in science and mathematics, where different activities such as forums, tasks and the use of videos were developed.

Problem-solving and scientific thinking is important in the learning process of students because it involves what they know about a situation, and urges them to try solutions that make them think, through metacognitive processes to check the result and reflect on what they have done (Patiño et al., 2021). Problem-solving is the individual's ability to engage in cognitive processes to understand and solve problem situations in which the solution strategy is not obvious or immediate (Hernández et al., 2021; Hernández et al., 2022; Hernández-Suarez, 2022)

Given this situation, the article presents the experience around the use of the Classroom and the students' perception of the design, implementation and evaluation of a course on problem-solving and scientific thinking in a digital environment.

Theoretical basis for the course

Godino (2003a) highlights that the Theory of Didactic Situations, from a Piagetian perspective, postulates that all knowledge is constructed by the constant interaction between the subject and the object of learning, being the contents the basis on which the hierarchy of mental structures is developed. In the same sense, Brousseau (1997) points out that didactic situations mainly involve three elements: the student, the teacher and the didactic medium; and it is the teacher who provides the medium in which the student constructs his or her knowledge. In this way, the didactic situation is the set of interrelationships that occur between these elements (teacher - student - didactic medium - student - didactic medium). These situations are seen as didactic experiences, which are the convergence of teachers, students, resources and activities in a natural or virtual ecosystem, with a systemic relationship between strategies classified according to the agent carrying out the action in teaching, learning and assessment strategies (Feo, 2015).

Course curriculum design

In any training process, it is necessary to know not only the subject of study, learning theories and didactic strategies, but in virtual training it is essential to know the technological medium to generate the learning environment, which considers technology as a cognitive tool that the student will use to build his knowledge (Vargas-Murillo, 2021).

The different conceptions of curriculum development are expressed through a design model that serves as a guide to systematise the process of developing training actions, with interrelated activities that allow us to create environments that really facilitate, in a mediated way, the processes of knowledge construction.

The development of the didactic experience was based on a planned process of curriculum design with the ADDIE model, composed of five (5) phases: Analysis, Design, Development, Implementation and Evaluation (Maribe, 2009) which serves as a general framework for the development of virtual or hybrid courses (Albarracín et al., 2020).

Google Classroom as a course environment

It is a free Google application for educational purposes that can be linked with other Google tools such as Documents, Forms, Drive, Calendar and others (Alves & Lima, 2018) as a flexible learning management system (Izenstark, & Leahy, 2015) to be applied in face-to-face, virtual or blended learning activities where a virtual classroom can be created with resources (documents, videos, links, etc.) and activities (forums, tasks, etc.). It also allows the assignment of tasks, the creation of exams, the creation of public folders, voice comments and digital portfolios (Guevara et al., 2019) to facilitate teachers to better manage their time and classes to improve communication with their students (Kraus et al., 2019) and is easy to use and intuitive for the student (Saeed et al., 2018).

Other advantages of Classroom are that it is easy to access and install, through a Gmail email, or Google account, it is cloud-based with an interconnected environment with these, as well as being easy to use on mobile devices (Iftakhar, 2016). This variety of resources and advantages make it more intuitive for students than other platforms (Tarango et al., 2019), which is why it is used in various educational contexts, in this case a transversal course that is not part of the curricular structure of the programme and is not available on an institutional platform, but given that the university where it was implemented has Google services, especially institutional Gmail, it was chosen to incorporate it and test it to support the subject of problem-solving and scientific thinking.

Method

The objective of the research was the design of a transversal course on problem-solving and scientific thinking directed to a group of students of a higher education program of teacher training in natural sciences, initially in the e-learning modality during the pandemic and after this, the most appropriate way to conduct it was the Design-Based Research (Hernández-Suárez et al., 2020), which consisted of 4 phases:

Analysis. A review of existing educational models and platforms was carried out.

Design. The curricular design of the course was initiated for the e-learning modality during the pandemic and b-learning after it, with the ADDIE method. With the purpose of guaranteeing the understanding of the thematic contents, the design of the classroom course on problem-solving and scientific thinking comprised 4 thematic axes: Classification, Inference, Hypothesis Formulation, Experimentation. These were structured in a planning that includes: the learning outcome, the competence, the content, and the pedagogical interaction (exploration, structuring, practice, transfer, assessment and evaluation). Evaluation rubrics were established so that students' progress is not only due to completing the online activities, rather than learning the content or developing the skills the student is expected to achieve. In this phase, processes such as access to the course, administration and management of the course, among others, were also carried out. For the b-learning model, the course had a duration of 16 hours in face-to-face mode and 32 hours in the Classroom environment.

Application. The educational process was applied through the implementation of the Classroom course to a group of 35 students of a higher education program of teacher training in natural sciences. During this stage, it was possible to correct failures in the process. In this phase, the progress and motivation of the students with the activities proposed in the Classroom was evidenced.

Evaluation. A questionnaire survey was conducted on Google forms of student satisfaction using a Likert scale (Nemoto & Beglar, 2014) to assess the relevance, consistency, practicality and efficiency of the Classroom course. The questionnaire consisted of the following dimensions as proposed by Prada-Núñez et al. (2020): (1) Functional aspects of the Classroom course (3 items); (2) Course design and training environment (6 items); Course organization and planning (3 items); Learning (3 items); Assessment (2 items); Teaching role (5 items); Classroom resources (4 items); Complementary services (4 items) and Overall assessment of the Classroom course (2 items). The final questionnaire consisted of 32 items on a Likert scale and was validated by Cronbach's alpha reliability coefficient with a reliability of 0.72**.**

Results

The results presented below correspond to the implementation process of the b-learning course, which took place after the pandemic period.

Functional aspects of the Classroom course. Regarding the functional aspects of the Classroom course, most of the students considered that the interest (67.9%), the usefulness in the learning process (75.0%) and the appropriateness of the adaptation to their learning needs (82.1%) were highlighted.

Design of the Classroom course and its training environment. Regarding the design of the Classroom course and its training environment, the students think that the ease of use offered by the course stands out (71.4%), that the design of screens, images, texts that consolidate the presentation of the interface stands out (82.2%), the high quality of the resources available (92.9%), the structuring of the contents is also highlighted (87.3%), the interactivity with the environment was appropriate (88.9%) and finally, they consider the application of Google Classroom to be innovative (89.3%).

Organization and planning of the course in Classroom. For the organization and planning of the course in the Classroom, the majority of students perceive the scheduling of activities as adequate (92.1%), that it was appropriately adjusted to their interests (82.2%) and that they consider that it was developed appropriately (85.7%).

Learning. Regarding learning in the course environment, most students perceive that the promotion of their autonomy to learn was adequate (71.5%), as well as the activities to promote collaborative learning (78.6%) and the attractiveness of the activities developed during their learning process (85.7%).

Assessment. The majority of students (82.2%) found the assessment of learning achievements and the relevance of the course and the proposed activities appropriate.

Teaching role. For the role of the teacher in the course environment, for most of the students the monitoring of learning progress was appropriate (82.1%) and tutorial support both remotely and in person (75.0%) and adjusted to the timetable proposed by the teacher (71.4%), so that in general terms the students perceived the activity deployed by the teacher as preponderant.

Classroom resources. Regarding the use of resources in the course, the forum stands out as remarkable and the other complementary resources drive, documents, forms and as outstanding in the majority of students (71.4%), which are useful to facilitate communication (75.0%), interaction, collaboration (78.6%) and learning (87.7%). Finally, students highlight the Classroom notification system (71.4%).

Overall assessment of the Classroom course. Finally, in terms of the overall assessment, the majority of students consider Google Classroom to have a prominent technical quality (82.2%) and usefulness (89.3%).

Discussion

We present the design and structure of a Google Classroom course on problem-solving in science and mathematics that allows teachers to organize, communicate and manage tasks, which enables alternatives for teaching content according to curriculum planning and design (Osman, 2017). In this sense, the choice of Classroom as a training environment is because, according to Kraus et al. (2019), it improves collaborative work, it is easy to use, study material can be organized more appropriately and time can be optimized. For Gómez (2020), on the other hand, it is a tool that makes it possible to manage educational processes in an agile and easy way, making it possible to create classes, assign homework, grade, send comments and have access to the entire educational process in a single place. The course is complemented by other Google tools such as Chat, Gmail, for communication, since being also a mobile application this is done in real time (Bautista, 2018) and for interaction and collaboration such as YouTube, Drive, Documents, spreadsheets among others (Bondarenko et al., 2019) as well as the use of audiovisual material in text, image and audio formats, which are automatically saved in Google Drive, allowing both the teacher and the students and teachers not to worry about the management and backup of documents (Izenstark & Leahy, 2015).

The design of the course allows the student the opportunity to explore the resources and tools of the Classroom environment autonomously as an interactive learning experience. This provides a learning environment that moves away from traditional methods through the use of different collaborative work tools (Gómez, 2020b) because it provides a way to create a repository where students can integrate their activities (Brumbaugh et al., 2014) as well as facilitating the submission of assignments, which encourages active student learning (Mohd et al., 2016). On the other hand, assessment rubrics were also established to monitor student autonomy in their learning to evaluate in a formative way and make pedagogical use of the results (Castaño Uribe, 2019).

Some limitations with the implementation of the Classroom course have to do with access to technological devices and connectivity on a continuous basis by some students, which hinders or delays the student learning process. Other limitations with the b-learning modality is that some students believe that there is a separation between face-to-face and non-face-to-face, meaning that the class does not end when the timetable ends, but continues in the digital classroom, in this case in the Classroom (Kraus et al., 2019).

After the pandemic, the digital transformation has already taken place in educational institutions, students are developing in a digital environment, producing products according to their environment, and interacting in social networks (Hernández Suárez et al., 2022). This shows the urgency of continuing to work with virtual environments generated by ICT and manage their learning autonomously. It is assumed that the use of mobile phones to support face-to-face classes, as before the pandemic, should not be banned again (Ortega et al., 2020). Finally, in the return to face-to-face classes, teachers must know the best way to be able to teach after the pandemic and adapt to the digital era with new approaches where the student is responsible for their learning, through the creation and production of educational artefacts such as the Classroom (Caparrós, 2014) in hybrid learning environments, which allows face-to-face education but is complemented by digital environments (Hernández Suárez, et al., 2022; Prada Núñez et al., 2022).

Conclusions

Regarding the functional aspects of the Classroom course, students consider that this type of experience is useful in their learning process, adapts to their needs and arouses motivation in them, as it is a user-friendly application, there is quality in the resources available and the design of screens, images and texts that consolidate the presentation of the interface stand out, which improves interactivity.

The planning of the course is adequate to the schedule and the development of activities is adjusted to their interests. Regarding learning, students perceive that the experience promotes their autonomy to learn and facilitates collaborative learning. Regarding the role of the teacher, the findings suggest that the students felt supported in terms of the management of the activities, the tutoring, the face-to-face meetings, the programmed activities and the monitoring of their progress.

The use of forums and other complementary resources were very useful, outstanding and of high quality. In addition, the information management, the availability of communication channels, the notification system and the communication service were relevant and supportive to their learning process. In general, the overall assessment of the course was positive, as the students highlight its usefulness and high technical quality.

Some limitations to highlight were that some students did not have access to connectivity and/or technological resources on a continuous basis. But despite these situations, a technology-mediated educational model is an alternative to provide continuity to the educational process in contingencies such as the absence of the teacher and/or students, or in extreme situations such as the pandemic, but its design, implementation and development imply more time and work for the teacher and students. Finally, it is recommended that the experience be replicated in other contexts with similar characteristics.

References

Albarracín, C. Z., Hernández, C. A., & Rojas, J. P. (2020). Objeto virtual de aprendizaje para desarrollar las habilidades numéricas: una experiencia con estudiantes de educación básica. Panorama, 14(26), 111–133. https://doi.org/10.15765/pnrm.v14i26.1486

Alves, F., & Lima, D. (2018). Uso de la clasificación para el análisis y la minería de datos en la herramienta de enseñanza-aprendizaje Google Classroom. Nuevas Ideas en Informática Educativa, 14, 589-594. http://www.tise.cl/Volumen14/TISE2018/589.pdf

Avendaño-Castro, W. R., Hernández-Suárez, C., & Prada-Núñez, R. (2021). El docente universitario ante la emergencia educativa. Adaptación a las TIC en los procesos de enseñanza. Educación y Humanismo, 23(41).

https://doi.org/10.17081/eduhum.23.41.4354
Bautista, D. (2019). Aplicación móvil para la gestión de calidad y satisfacción del servicio a los clientes en la empresa Famitiendas distribuciones S.A.S de Bucaramanga (tesis de pregrado, Universidad Autonoma de Bucaramanga). Repositorio Institucional UAB. https://repository.unab.edu.co/bitstream/handle/20.500.12749/7291/2019_Tesis_Diego_Bautista_Sanchez.pdf?sequence=1&isAllowed=y

Bondarenko, O., Mantulenko, S., & Pikilnyak, A. (2019). Google Classroom as a Tool of Support of Blended Learning for Geography Students. CEUR Workshop Proceedings 2257, 182-191. https://doi.org/10.48550/arXiv.1902.00775

Brousseau, G. (1997). Theory of Didactical Situations in Mathematics. Kluwer.

Brumbaugh, K., Calhoon, E., Munsallam, R., Pronovost, R., & Tucker, C. (2014). Creating a Google Apps Classroom: The Educator's Cookbook (Classroom Resources). Shell Educational.

Calero, C. (2019). La llegada de las nuevas tecnologías a la educación y sus implicaciones. International Journal of New Education, (4), 1-40. https://doi.org/10.24310/IJNE2.2.2019.7449

Calle, G. Y., & Agudelo, I. D. (2019). Resolución de problemas con tecnología en un ambiente de aprendizaje colaborativo wiki en la educación media. Revista Logos Ciencia & Tecnología, 11(2), 151–165. https://doi.org/10.22335/rlct.v11i2.876

Calle, G. Y., & Agudelo, I. D. (2021). Características didácticas de un ambiente de aprendizaje colaborativo para la resolución de problemas con tecnología en la educación media. Plumilla Educativa, 27(1), 15-38. https://doi.org/10.30554/pe.1.4198.2021

Caparrós, M. L. (2014). El entorno Google. De Gmail a la Google Classroom. En F. Trujillo, Artefactos digitales: Una escuela digital para la educación de hoy (pp. 123-130). GRAÓ.

Castaño Uribe, G. J. (2019). La evaluación formativa una mirada desde el proceso de escritura en diversas áreas. Ruta Maestra, 26, 116-121. https://rutamaestra.santillana.com.co/wp-content/uploads/2019/07/La-evaluación-formativa.pdf

Collantes, E., & Collantes, Z. M. (2022). Impacto de la plataforma google classroom en las competencias matemáticas. Ciencia Latina Revista Científica Multidisciplinar, 6(1), 293-315. https://doi.org/10.37811/cl_rcm.v6i1.1499

Delgado, U., & Martínez, F. G. (2021). Entornos virtuales de aprendizaje adoptados en la universidad ante el COVID-19. Diálogos sobre educación. Temas actuales en investigación educativa, 12(22), 1-14. https://doi.org/10.32870/dse.vi22.829

Feo, R. (2015). Orientaciones básicas para el diseño de estrategias didácticas. Tendencias Pedagógicas, 16, 221–236.

Fernández-Cézar, R., Hernández-Suárez, C. A., Prada-Núñez, R., & Ramírez-Leal, P. (2020).

Creencias y ansiedad hacia las matemáticas: un estudio comparativo entre maestros de Colombia y España. Bolema: Boletim de Educação Matemática, 34(68), 1174-1205. https://doi.org/10.1590/1980-4415v34n68a16

Gamboa, A. A., Hernández, C. A., & Prada, R. (2020). Efectos depresivos del aislamiento preventivo obligatorio asociados a la pandemia del Covid-19 en docentes y estudiantes de una universidad pública en Colombia. Psicogente, 24(45), 1–20. https://doi.org/10.17081/psico.24.45.4156

Godino, J. (2003). Perspectiva de la didáctica de las matemáticas como disciplina científica. Universidad de Granada. https://www.ugr.es/~jgodino/fundamentos_teoricos/perspectiva_ddm.pdf

Gómez, J. (2020b). Buena práctica docente para el diseño de aula virtual en Google Classroom. Revista Andina de Educación 3(1), 64-66. https://doi.org/10.32719/26312816.2020.3.1.7

Gómez, J. M. (2020a). Google Classroom: como herramienta para la gestión pedagógica. Mamakuna, (14), 44–54.

Guevara, L. A., Magaña, E. A., & Picasso, A. L. (2019). El uso de Google classroom como apoyo para el docente. CONISEN, 1-14. http://www.conisen.mx/memorias2019/memorias/5/P717.pdf

Hernández Suárez, C. A., Avendaño Castro, W. R., & Gamboa Suárez, A. A. (2022). Perspectives on Social Learning and its Operationalization from the Use of Virtual Platforms. Journal of Language and Linguistic Studies, 18(3). https://jlls.org/index.php/jlls/article/view/4923

Hernández Suárez, C. A., Pabón Galán, C. A. & Meza Osorio, H. (2020). Opportunities and challenges of the hybrid modality in higher education. Journal of Language and Linguistic Studies, 18(1), 1067-1075. https://www.jlls.org/index.php/jlls/article/view/4920

Hernández, C. A., Paz, L. S., & Avendaño, W. R. (2021). Resolución de problemas en el aprendizaje de las ciencias y progreso académico en la educación media. Revista Boletín Redipe, 10(13), 610–618. https://doi.org/10.36260/rbr.v10i13.1774

Hernández, C. A., Prada, R., & Avendaño, W. R. (2022). Pedagogical Practice and Problem Solving in Mathematics Teaching. Journal of Language and Linguistic Studies, 18(2), 1143-1154. https://www.jlls.org/index.php/jlls/article/view/4911

Hernandez, R. (2017). Impacto de las TIC en la educación: Retos y Perspectivas. Propósitos y Representaciones, 5(1), 325–347. https://doi.org/10.20511/pyr2017.v5n1.149

Hernández-Suarez, C. A., Paz-Montes, L. S., & Castro, W. A. (2022). Problem solving in the physics classroom. An analysis with secondary school students. In Journal of Physics: Conference Series, 2163(1), 012010:1-6.

Hernández-Suárez, C. A., Prada-Núñez, R., & Gamboa-Suárez, A. A. (2020). Formación inicial de maestros: escenarios activos desde una perspectiva del aula invertida.

Formación universitaria, 13(5), 213-222. https://doi.org/10.4067/S0718-50062020000500213

Iftakhar, S. (2016). Google classroom: what works and how? Journal of Education and Social Sciences, 3, 12-18.

Izenstark, A., & Leahy, K. L. (2015). Google classroom for librarians: features and opportunities, Library Hi Tech News, 32(9), 1-3. http://doi.org/10.1108/LHTN-05-2015-0039

Kraus, G., Formichella, M. M., & Alderete, M. V. (2019). El uso del Google Classroom como complemento de la capacitación presencial a docentes de nivel primario. Revista Iberoamericana de Tecnología en Educación y Educación en Tecnología, (24), 79-90. https://doi.org/10.24215/18509959.24.e09

Maribe, R. (2009). Instructional design: The ADDIE approach. Springer Science & Business Media. https://doi.org/10.1007/978-0-387-09506-6

Mariño, L. F., Hernández, C. A., & Prada, R. (2021). Explorando relaciones entre la resolución de problemas de física y matemática. Revista Boletín Redipe, 10(10), 440–455. https://doi.org/10.36260/rbr.v10i10.1502

May, N. K., Patrón, R. M., & Sahuí, J. A. (2017). Ambientes educativos a Distancia para la mejora de la enseñanza: Uso de Classroom. Revista Electrónica sobre Cuerpos Académicos y Grupos de Investigación, 4(8). https://www.cagi.org.mx/index.php/CAGI/article/view/151

Mohd, I., Mohd, J., & Mohamad, S (2016). Google Classroom as a tool for active learning. American Institute of Physics Conference Proceedings, (1761). https://doi.org/10.1063/1.4960909

Morales-Cortés, C., & Tello-Contreras, J. M. (2020). El trabajo colaborativo en la resolución de problemas. Zenodo. https://doi.org/10.5281/zenodo.4041885

Muñoz, M. M. (2022). Herramientas del aula virtual en la enseñanza de la matemática durante la pandemia, una revisión literaria. Revista Conrado, 18(84), 310-315.

Nemoto, T., & Beglar, D. (2014). Developing Likert-scale questionnaires. In N. Sonda & A. Krause (Eds.), JALT2013 Conference Proceedings. JALT.

Ortega, D., Rodríguez, J., & Mateos, A. (2021). Educación superior y la COVID-19: adaptación metodológica y evaluación online en dos universidades de Barcelona. Revista Digital de Investigación en Docencia Universitaria, 15(1), e1236: 1-13. http://doi.org/10.19083/ridu.2021.1275

Ortega, E., Chale, J., & Ledesma, C. (2020). Reflexiones sobre el uso del celular en la escuela (pandémica) de tres ciudades de Suramérica. Revista Latinoamericana en Comunicación, Educación e Historia, (2), 135-150. https://revistas.unc.edu.ar/index.php/comedhi/article/view/36012

Ortiz, L. (2021). Una reflexión sobre el proceso de adaptación a la pandemia en la educación superior. En Líneas Generales, (006), 10-20.

https://doi.org/10.26439/en.lineas.generales2021.n6.5587

Osman, S. A. (2017). The impact of Google classroom application on the teaching efficiency of pre-teachers. International Journal of Social Sciences and Education, 7(2), 45-54. http://ijsse.com/sites/default/files/issues/2017/v7i2/Paper-4.pdf

Patiño, K. N., Prada, R., & Hernández, C. A. (2021). La resolución de problemas matemáticos y los factores que intervienen en su enseñanza y aprendizaje. Revista Boletín Redipe, 10(9), 459–471. https://doi.org/10.36260/rbr.v10i9.1453

Peña, A., Giovanella, C., Espinoza-Valdez, A., Muñoz, M., Bonilla D., & Pasarrelli, M. (2021). Adaptación al uso tecnología en el ámbito educativo durante la pandemia derivada del COVID-19 en México. ReCIBE, Revista electrónica de Computación, Informática, Biomédica Y Electrónica, 10(2), C3–24. https://doi.org/10.32870/recibe.v10i2.222

Prada Núñez, R., Hernández Suárez, C. A., & Gamboa Suárez, A. A. (2022). Using ICT in a Hybrid Environment for Science Education: A Postpandemic Learning Experience. Journal of Language and Linguistic Studies, 18(3). https://jlls.org/index.php/jlls/article/view/4921

Prada-Núñez, R., Hernandez-Suárez, C. A., & Paz-Montes, L. S. (2020). Web 2.0 Tools: A mediation in the teaching and learning process of mathematics and physics in higher education. Revista espacios, 41(50), 456-464. http://revistaespacios.com/a20v41n50/20415031.html

Saeed, M., Tahir, H., & Latif, I. (2018). Teachers' Perceptions about the Use of Classroom Assessment Techniques in Elementary and Secondary Schools. Bulletin of Education and Research, 40(1), 115-130.

Tarango, J., Machin-Mastromatteo, J. D., & Romo-González, J. R. (2019). Evaluación según diseño y aprendizaje de Google Classroom y Chamilo. IE Revista de Investigación Educativa de la REDIECH, 10(19), 91-104. https://doi.org/10.33010/ie_rie_rediech.v10i19.518

Torres, H. P., Medina, M. Á., Hernández, C. A., Salazar, T., Sagredo, E., & Carvajal-Muñoz, P. (2022). Back to College classes within the context of COVID-19. Journal of Positive Psychology and Wellbeing, 6(1), 783-794. https://journalppw.com/index.php/jppw/article/view/992

Vargas-Murillo, G. (2021). Diseño y gestión de entornos virtuales de aprendizaje. Cuadernos Hospital de Clínicas, 62(1), 80-87.