MENDIVE
REVISTA DE EDUCACIÓN

Original article

Strategy for the training and development of infotechnological skills

Estrategia para la formación y desarrollo de las habilidades infotecnológicas

Estratégia para a formação e desenvolvimento de competências infotecnológicas

Yoesky Reyes Galardy [1]
https://orcid.org/0000-0003-4314-9625
Jorge Estrada Silveira [2]
https://orcid.org/0000-0002-6125-4376

[1] University of Granma "Blas Roca". Jiguani Municipal University Center . Cuba.
yreyesg@udg.co.cu
[2] CITMA Provincial. Cuba.
jestrada@granma.inf.cu

Received: September 6, 2022.
Accepted: July 5, 2023.

ABSTRACT
The didactic strategy is the empirical and theoretical interpretation that allows determining and formulating as a problem: deficiencies in the training and development of computer skills in the second cycle of Primary Education, which limits the learning of the Computing subject. The objective of the work was: the elaboration of a didactic strategy for the formation and development of infotechnological skills in the students of the second cycle of Primary Education, which favors the learning of the Computing subject by them. Methods and techniques of the qualitative criterion of the investigation, observation, interview, survey, pedagogical test and document review, were used in order to achieve the proposed purpose. The main result proposed was the strategy for the formation and development of infotechnological skills in students of Primary Education, as well as the system of actions that emerged as part of the four stages that comprise it: diagnosis, planning and orientation, execution and evaluation. This strategy allowed the preparation of teachers, through the form of organization of teacher preparation.

Keywords: Skills; Infotechnology; strategy; Teaching learning process.

RESUMEN
La estrategia didáctica, es la interpretación empírica y teórica que permite determinar y formular como problema: insuficiencias en la formación y desarrollo de las habilidades informáticas en el segundo ciclo de la Enseñanza Primaria, que limita el aprendizaje de la asignatura Computación. El trabajo tuvo como objetivo: la elaboración de una estrategia didáctica de formación y desarrollo de las habilidades infotecnológicas en los educandos del segundo ciclo de la Enseñanza Primaria, que favorezca el aprendizaje de la asignatura Computación por parte de estos. Se utilizaron métodos y técnicas del criterio cualitativo de la investigación la observación, la entrevista, la encuesta, la prueba pedagógica y la revisión de documento, en función de lograr el fin propuesto. El principal resultado propuesto fue la estrategia de formación y desarrollo de las habilidades infotecnológicas en los educandos de la Enseñanza Primaria, así como el sistema de acciones que surgieron como parte de las cuatro etapas que la conforman: diagnóstico, planificación y orientación, ejecución y evaluación. Dicha estrategia permitió la preparación de los docentes, a

través de la forma de organización de preparación del docente.

Palabras clave: Habilidades; Infotecnología; estrategia; proceso enseñanza-aprendizaje.

RESUMO
A estratégia didática é a interpretação empírica e teórica que permite determinar e formular como problema: deficiências na formação e desenvolvimento de competências informáticas no 2º ciclo do Ensino Básico, que limitam a aprendizagem da disciplina de Informática. O objetivo do trabalho foi: a elaboração de uma estratégia didática para a formação e desenvolvimento de habilidades infotecnológicas nos alunos do segundo ciclo do Ensino Fundamental, que favoreça o aprendizado da disciplina de Informática por eles. Métodos e técnicas do critério qualitativo de investigação, observação, entrevista, pesquisa, teste pedagógico e revisão documental, foram utilizados para atingir o objetivo proposto. O principal resultado proposto foi a estratégia para a formação e desenvolvimento de competências infotecnológicas em alunos do Ensino Fundamental, bem como o sistema de ações que emergiu como parte das quatro etapas que a compõem: diagnóstico, planejamento e orientação, execução e avaliação. Essa estratégia permitiu a preparação de professores, por meio da forma de organização da formação de professores.

Palavras-chave: Habilidades; Infotecnologia; estratégia; Processo ensinoaprendizagem.

INTRODUCTION

The National Education System promotes the introduction of computing in Primary Education, so that students in all their activity have an active, critical, reflective, independent and leading role in a participatory, flexible and regulated teaching-learning process, where Information technology plays an important role.

Therefore, the preparation that is planned must be aimed at: the insufficiencies in the training and development of computer skills in the second cycle of Primary Education, which limits the learning of the Computer subject.

Likewise, they provide results on fundamental skills in computer science teaching focused on a system and a methodology for the training of basic computer skills, in addition to objectives based on skills related to computer manipulation, such as computer skills. with the keyboard, navigation through educational software, Wikipedia and Internet Explore.

However, the skills related to the organization and search for information with the use of computer tools, that is, infotechnological skills, are not sufficiently treated and thus raise the quality of the teaching-learning process.

This work is based on the MINED Branch Program: "Current problems of the Cuban Educational System. Development perspectives." The research is contextualized in the conditions of the Jiguaní municipality and in the teaching-learning process. It responds to one of the priorities for the application of science and technology in Cuba and in the procedures of the strategy aimed at preparing teachers and students of Primary Education in the training and development of infotechnological skills.

In addition, it guarantees the improvement of Primary Education, in training and development by acquiring infotechnological

skills about the integration of technological and portable resources such as: laptop, minilaptop, mobile phones, tablets and other resources, commissioned by the 2030 Agenda for development. sustainable.

Authors such as: Martínez (2018); Navarro (2019), Antúnez (2019); Autumn (2020); Kings (2020); Morales (2021); Garcia (2021); García (2021) and provide theories of work with certain computer tools, some aspects in relation to the organization and use of infotechnology for learning, without delving into and studying the training and development of infotechnological skills in Primary Education students. .

The new conditions impose the development of the teaching-learning process, based on the use of infotechnological tools as the main mediation support. Reyes (2021) shows how, internationally and in Cuba, infotechnological skills have been worked on by different authors.

Infotechnological skill as: "A process of carrying out and organizing actions and operations that contribute to obtaining effectiveness in practice with the use of technology in learners, to achieve greater preference for sophisticated tools for the search, review and processing of information" (p.8).

It is considered that to achieve information management, one must know the existing tools for navigation, search, review and processing of information. It is important to highlight that there is no mention of the use of infotechnological tools in Primary Education or the training and development of infotechnological skills.

infotechnological skills, the linkage of information and communications technologies must be kept in mind. Related to this topic, Morales (2021) provides theories of work with certain computer tools, some aspects in relation to the organization and the use of infotechnology for learning.

For the development of this research, the criteria of Finder (2021) are assumed, which have provided valuable and recognized results for their theoretical and methodological value, however, it is appreciated that these contributions need to be contextualized by the dizzying advance of technology. currently. It should be noted that among computer skills are infotechnological skills , which are insufficiently treated within the teaching-learning process.

In this sense, it is proposed that the actions designed should be aimed at continuing the training and development of infotechnological skills , through the use of infotechnological tools , to contribute to the knowledge, skills and values necessary for the teaching process. -learning.

This situation constitutes the problem to be resolved in this study: insufficiencies in the training and development of computer skills in the second cycle of Primary Education, which limits the learning of the Computer subject. The purpose of this work is: the development of a didactic strategy for the training and development of infotechnological skills in Primary Education students, which favors their learning of the Computing subject.

MATERIALS AND METHODS

The research assumed the dialectical-materialist as a general method; theoretical methods such as historical-logical, analysis-synthesis, induction-deduction, dialectical hermeneutics, modeling and systemic-structural functional were used. Among the empirical analysis of documents, observation, interview, pedagogical test, pre-experiment as a variant of the pedagogical experiment and triangulation; Statistical methods were also used.

The theoretical level methods allowed us to determine the theoretical definition of Infotechnology and the definition and structuring of the infotechnological skills to

be developed in the Computing subject, with its actions and operations, the current state was characterized and the considerations derived from the actions developed were established. to corroborate the viability of the proposal made.

The methods of the empirical level, verify and verify the difficulties and achievements that the students have and the preparation of teachers for the training and development of infotechnological skills, compile information in the Computing subject program, methodological guidelines and reports from the groups of cycle that allows us to know the background and after the implementation of the strategy and its viability is assessed.

Statistical methods were used to organize data and process the results obtained to allow the calculation of descriptive statistics and inferential statistics, in addition to the initial verification of the problem, the performance of hypothesis tests, in the processing of the evaluation. by expert criteria, as well as in the justification of the significant differences in the results of the pre-experiment.

The research process was developed at the Conrado Benítez García primary school in the Municipality of Jiguaní, Granma Province, with a population made up of 25 users, who teach the subject Computing in different grades of Primary Education, based on the results of the professional activity, methodological experience and your personal willingness to participate in the survey. For the expert criteria, 24 experts are selected.

RESULTS

The application of the methods used allowed us to obtain the following results:

In the observations, it was possible to verify and confirm the difficulties and achievements that students have in the use of Infotechnology in the teaching-learning process and the preparation of teachers for the training and development of infotechnological skills.

It is vitally important that teachers who teach the subject Computing, in their classes, have experiences in the infotechnological approach, to transform knowledge, skills and values in the teaching-learning process.

The need for improvement related to the topic in: the lack of understanding, comprehension, interest and need, which reveals the limited learning of computer content, computer skills for problem solving, development of computer skills, the appropriation of essential knowledge of the subject Computing and preparation for the search and processing of information

The strategy proposed by Valle (2007) is assumed to be sequential and interrelated actions that, starting from an initial state and considering the proposed objectives, allow directing the development of the teaching-learning process . The proposed strategy is made up of 4 stages, which are detailed below:

1st Stage. Diagnosis for the training and development of infotechnological skills .

Objective: diagnose the level of knowledge achieved by students for the training and development of infotechnological skills.

Fundamental actions:

- Conception of the diagnosis of the training and development of infotechnological skills in students.
- Identification of the main deficiencies and potentialities related to learning, knowledge and computer skills, in students and teachers.
- Characterization of students and teachers in relation to their training and development of computer skills.
- Raising awareness among students and teachers about the need to resolve the limitations provided by the diagnosis.

- Design a diagnosis of the level of knowledge and psycho-pedagogical characteristics of the students, as well as the availability of infotechnological tools in the school and community environment.
- Characterize, based on the diagnosis, the insufficiencies and potentialities that exist for the achievement of infotechnological skills in students.

The diagnosis is a mandatory requirement, which aims to know the real state of the training and development of infotechnological skills , through the use of methods and techniques that corroborate the identified problems. The regularities emanating from the diagnosis are the starting point to efficiently initiate and guide the actions and operations in the students of the second cycle of Primary Education.

2nd Stage. Planning and Guidance of actions for the training and development of infotechnological skills.

Objective: Design the necessary planning and organizational actions that guarantee the necessary conditions for the training and development of infotechnological skills .

- Determine the infotechnological tools available in the school's technological environment, with emphasis on the tools under study according to the program, collection of educational software, tools for working on the network and for information management.
- Determine the knowledge systems, skills and infotechnological tools to use in the teaching-learning process.
- Plan the objectives, knowledge systems in which the infotechnological skills and computer tools to be used are introduced or applied, as well as the evaluation system to be applied.
- Determine at what moments in the Computing subject program, such as: technology, tools, information, search, navigation, browser, page and website, infotechnology, search engines, search engines, information search, intranet, network, email, podcast and others.
- Plan the use of Infotechnology in problem solving, extra-class, practical and independent work, both in Computer Science and the rest of the subjects.
- Determine what activities and problematic situations and problems can be carried out to motivate the student about the need, importance and advantages of using infotechnological tools.
- infotechnological tools from mobile devices, laptops, tablets, desktop computers that serve for the training and development of infotechnological skills.
- Determine the actions to be carried out that allow students to complement their learning, with the use of applications, educational software, encyclopedias and digital dictionaries and that contribute to the development of infotechnological skills.
- Organize the technological infrastructure necessary to develop the planned infotechnological skills , including connection through the wireless network for personal use (Bluetooth and portable WiFi) in which activities are developed such as: sharing information, chat and group games for training purposes, educational and playful.
- Plan problematic situations in the school, family and community context with the use of the grapher, word processor, digital presentation editor, spreadsheets and visual programming tools: ScratchJr .

3rd Stage. Execution of actions for the training and development of infotechnological skills.

Objective: Apply in the teaching-learning process, the planned actions for the training and development of

infotechnological skills , so that they favor information management.

Fundamental actions:

- Raise awareness among students regarding their decisive participation in the evaluation process of the training and development of infotechnological skills .
- Present problematic situations that allow the necessary motivation of students to address the computer content that serves as a basis for the formation of infotechnological skills .
- Apply in educational practice the system of actions designed for the training and development of infotechnological skills .
- infotechnological skills with increasing levels of difficulty in which the generalization and transfer of more general actions allows these skills to have been formed and developed by the end of Primary Education.
- Take advantage of the class to create in the students positive states of mind towards the use of computer tools in solving contextual problems.
- Carry out actions aimed at developing critical and evaluative thinking about information, compliance with ethical precepts and the provisions of computer security.
- Perform activities with increasing levels of information search: text in a file, files in a folder, files on the computer, information in software, intranet, website and Internet.
- Use activities that allow students to demonstrate the appropriation of knowledge and the skills to manage information using infotechnology, through competitions, contests, circles of interest, creation of portfolios and presentation of results.
- Develop skills for the transmission and communication of information, through the systematic use of emails, messages and the use of tools for electronic presentations and chat.
- Carry out actions with the teachers of the degree, to ensure that the skills for the organization, processing, search and communication of information are applied by the students, not only in the Computing subject, but also in the rest of the subjects through of activities and soft areas of the subjects.
- Put the student systematically in situations in which he or she has to assess the advantages and limitations of using different infotechnological tools to solve different tasks, so that it allows him or her to select the most appropriate one at all times.
- infotechnological skills formed in the students, to use other tools frequently used in the community for the same purposes, such as mobile phones, tablets, Wi-Fi, data connection, photos and video conferencing, which allow these skills to be expanded and further developed.

4th Stage. Evaluation of actions for the training and development of infotechnological skills.

Objective: Evaluate the training and development of the infotechnological skills of the students.

In this stage, the students are evaluated in relation to the transformations achieved in the process, based on the comparison of the results obtained and the plan of achievements and objectives designed. These actions may include rethinking actions and objectives.

The application of the strategy was carried out taking into consideration the sequence and content of the stages and actions that structure it. The training and development of infotechnological skills in the proposed Primary Education goes through the processes: 1st Stage. Diagnosis, 2nd Stage. Planning and Guidance, 3rd Stage.

Execution and 4th Stage. Evaluation of actions for the training and development of infotechnological skills.

A questionnaire was given to each user to assess the quality of the strategy. They offered criteria for the indicators based on a scale of values: excellent (5), very good (4), good (3), fair (2) and insufficient (1). The results for the 25 teachers for each indicator of the guide ranged from an average of 4.24 to 5, which allows us to affirm that the strategy for the training and development of infotechnological skills in Primary Education and its application in educational practice be satisfactory.

The evaluations given by the 25 users, the Kendall Coefficient of Agreement was used, the statistical package SPSS 20.0 for Windows was used and the non-parametric test was applied for K related samples, in this case K is the number of indicators (nine) subjected to evaluation by the 25 users. By applying the aforementioned test, the value of Kendall's coefficient of agreement (W) of 0.796 and an associated probability of less than 0.01 was obtained.

The result is of statistical significance, it is sufficient evidence to propose, with 99% confidence that the 25 users agree, in the quality of the theoretical and methodological conception, 100% express the objective of the strategy is Excellent, 9. 76% consider the foundation and conceptual apparatus that supports the strategy to be Very Good, 9.28% and 9.44% refer to the contribution of the strategy to the training and development of infotechnological skills in the second cycle of Primary Education.

In addition to the contextualized and singular nature of the actions contained in the Very Good strategy, the 9.24%, 9.92 and 9.76 allow us to affirm the potential for solving problems in the training and development of the teaching process. - Computer learning, the contribution of the strategy to the domain of the student's knowledge, skills and values and the specification of the proposed methods in the strategy.

infotechnological skills in the Computer subject, 100% affirm the usefulness of the proposed strategy to specify the preparation of the student and the application in solving problems of educational practice. As well as the effectiveness that the application of the designed strategy could present in educational practice.

DISCUSSION

The preparation of teachers at the Conrado Benítez García primary school is achieved through a didactic strategy that involves elements of Primary Education and the use of infotechnological tools that allow the student to advance, implement and work with information technologies. information and computing.

The main results of the didactic strategy for training and development of infotechnological skills in the teaching-learning process of students in the second cycle of Primary Education are detailed below:

- The motivation levels of the students to navigate and interact and be prepared in different Infotechnological aspects are substantially raised .
- It is feasible to use the didactic strategy to improve the teaching-learning process of Primary Education.
- The mastery of the Infotechnological contents established in the computer science program increased considerably, as well as the problems faced by the students were resolved.
- Contribution of the teaching strategy to the training and development of the student's infotechnological skills.
- Strengthening the skills of selection, search, purification, processing, storage and communication of information.

- infotechnological skills in the teaching-learning process of Computer Science offers potential in information management for problem solving.
- At the end of the research, the students showed greater development of their computer skills.
- Usefulness of the didactic strategy to specify the training and development of infotechnological skills in students.

It is concluded that, to achieve the objective of the work, the research used the logical-dialectical relationship that is developed through the qualitative interpretation of the results achieved with the partial exemplification of the proposed strategy and the assessment of the relevance of the main results. of research, which enables the formation of intervention actions that allowed structuring a strategy for training and developing infotechnological skills in Primary Education.

BIBLIOGRAPHIC REFERENCES

Álvarez de Zayas, C.M. (1999). Didáctica. La Escuela en la Vida. Ciudad de La Habana: Editorial Félix Varela. En soporte digital.

Antúnez, G. (2019). Infotecnología: una cultura ineludible en el docente de la educación superior del siglo XXI. *Opuntia Brava, 1(*Núm. Especial 1), http://opuntiabrava.ult.edu.cu/index.php/opuntiabrava/article/view/675

Ávila, Y. (2020). El aprendizaje de la informática con el empleo del software educativo Informática Básica. *Opuntia Brava*, *12*(4), 358-374. https://opuntiabrava.ult.edu.cu/index.php/opuntiabrava/article/view/1141

Finder, J. (2021). ¿Qué son las habilidades informáticas? https://kiiky.com/es/empleos/habilidades-inform%c3%a1ticas-para-un-curr%c3%adculum/

García Meneses, M., Diaz de la Cruz, J. & Coloma Rodríguez, O. (2021). Estrategia para la integración de las Tecnologías de la Información y las Comunicaciones en la formación inicial de docentes. *EduSol*, *21*(75), 96-108. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-80912021000200096&lng=es&tlng=es

García Vélez, K.A., Ortiz Cárdenas, T., & Chávez Loor, M.D. (2021). Relevancia y dominio de las competencias digitales del docente en la educación superior. *Revista Cubana de Educación Superior*, *40*(3), http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0257 -43142021000300020&lng=es&tlng=es

Hechavarría, Y. (2018). Las tecnologías educativas en el contexto de la escuela primaria. *Opuntia Brava*, *10*(2), 219-231. https://opuntiabrava.ult.edu.cu/index.php/opuntiabrava/article/view/100

Labarrere, G. & Valdivia, G. (1981). Pedagogía. Ciudad de La Habana, Cuba: Editorial Pueblo y Educación. En soporte digital.

Martínez, Y. (2018). El desarrollo de habilidades informáticas en la formación de docentes de matemática. *Revista Varela*, *18*(51), 336-347. http://revistavarela.uclv.edu.cu/index.php/rv/article/view/116

Morales, R. (2021). Infotecnología: herramienta para la gestión de información en la investigación.

Universidad de Guadalajara. México. https://biblioteca.udgvirtual.udg.mx/jspui/bitstream/123456789/3966/3/Infotecnolog%C3%ADa_herramienta_para_gesti%C3%B3n_de_informaci%C3%B3n.pdf

Navarro, M. (2019). La integración tecnológica en el aula, significaciones desde estudiantes de educación secundaria. 3C TIC. *Cuadernos de desarrollo aplicados a las TIC, 8*(2), 70-83. http://dx.doi.org/10.17993/3ctic.2019.82.70-83

Otaño, Y. (2020). La formación y desarrollo de habilidades informáticas en el profesional de la educación. Universidad de Ciencias Pedagógicas "Enrique José Varona". Santa Clara, Villa Clara, Cuba. Recuperado. https://trabajos.pedagogiacuba.com/trabajos/59Yeny%20Ota%C3%83%C2%B1o%20Aguilera.pdf

Reyes Galardy, Y., & Estrada Silveira, J. (2021). Evolución histórica del desarrollo de habilidades infotecnológicas en la educación primaria. *Revista Científica Del Amazonas*, *4*(8), 49-58. https://doi.org/10.34069/RA/2021.8.05

Reyes, Y. (2020). La didáctica de las herramientas infotecnología para desarrollar habilidades en escolares del segundo ciclo. IX Congreso Internacional de educación y pedagogía, La Habana, Cuba.

Reyes, Y. (2020). Experiencia de un curso sobre el uso de la infotecnología en las escuelas primarias. *Cuadernos de Educación y Desarrollo, 12*(1), https://ojs.europubpublications.com/ojs/index.php/ced/article/view/890

Torricella, R.G, & Carbonell, S. (2020). Infotecnología: La cultura informacional para el trabajo en la Web. https://dspace-libros.metabiblioteca.com.co/bitstream/001/486/1/informacion_en_web.pdf

Valle, A. (2007). Algunas formas de salida de los resultados científicos y vías que se han utilizado para su obtención. Instituto Central de Ciencias Pedagógicas: La Habana, Cuba

Conflict of interests:

The authors declare not to have any interest conflicts.

Authors' contribution:

The authors participated in the design, analysis of the documents and writing of the work.

Cite as
Reyes Galardy , Y., & Estrada Silveira, J. (2023). Strategy for the training and development of infotechnological skills . *Mendive. Journal of Education, 21*(4), e3199. https://mendive.upr.edu.cu/index.php/MendiveUPR/article/view/3199