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Estilos de **a**prendizaje, **h**ábitos de **e**studio, **a**prendizaje **b**asado en **p**royectos en **m**etodología de la **i**nvestigación

Learning styles, **s**tudy **h**abits, **p**roject-**b**ased **l**earning in **r**esearch **m**ethodology

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Abstract

This paper is aimed at presenting a project-based learning proposal for the subject Scientific Research Methodology at the Computer Science Engineering career, taking into account the learning styles of the group and the areas of opportunity identified to contribute to the improvement of students' study habits. The logical and historical analysis, the analytical synthetic method, the Honey-Alonso questionnaire of learning styles (CHAEA, for its Spanish equivalent) and the Iadov technique were used as research methods. Descriptive statistics are applied. The results of the diagnosis of learning styles were: active style: 11.6, reflective style: 16.5, theoretical style: 13.9 and pragmatic style: 14.6. The reflective style predominates.The active style is the one with the lowest score. The study showed that the diagnosis of learning styles constitutes a valuable resource that enriches the orientation of teachingbased on diversity and the improvement of learning.

With the insertion of project-based learning, students were directed to the leading role in the construction of their learning, declaring them active agents in the Teaching-Learning Process (PEA, for its Spanish equivalent) of the Research methodology subject. As a result, they were encouraged to learn how to face their future professional life. The level of satisfaction of the students with the use of project-based learning in the Research Methodology subject, as a way of stimulating study habits, was satisfactory.

Keywords: project-based learning, learning styles, study habits, research methodology.

Resumen

Este trabajo tiene como objetivo presentar una propuesta de aprendizaje basado en proyectos para la asignatura Metodología de la Investigación Científica de la carrera de Ingeniería en Ciencias Informáticas, teniendo en cuenta los estilos de aprendizaje del grupo y las áreas de oportunidad identificadas para contribuir a la mejora de los hábitos de estudio de los estudiantes. . Como métodos de investigación se utilizaron el análisis lógico e histórico, el método sintético analítico, el cuestionario de estilos de aprendizaje de Honey-Alonso (CHAEA) y la técnica de Iadov. Se aplica estadística descriptiva. Los resultados del diagnóstico de estilos de aprendizaje fueron: estilo activo: 11,6, estilo reflexivo: 16,5, estilo teórico: 13,9 y estilo pragmático: 14,6. Predomina el estilo reflexivo. El estilo activo es el que tiene menor puntuación. El estudio demostró que el diagnóstico de estilos de aprendizaje constituye un recurso valioso que enriquece la orientación de la enseñanza basada en la diversidad y la mejora de los aprendizajes. Con la inserción del aprendizaje basado en proyectos, se direccionó a los estudiantes a un rol protagónico en la construcción de sus aprendizajes, declarándolos agentes activos en el Proceso de Enseñanza-Aprendizaje (PEA) de la asignatura Metodología de la Investigación. Se propició que aprendieran a afrontar el estilo de trabajo que necesitarán en su futura vida profesional. El nivel de satisfacción de los estudiantes con el uso del aprendizaje basado en proyectos en la asignatura Metodología de la Investigación, como forma de estimular hábitos de estudio, fue satisfactorio.

Palabras clave: aprendizaje basado en proyectos, estilos de aprendizaje, hábitos de estudio, metodología de la investigación.

Introduction

The university has the responsibility to encourage students' interest in scientific development. The subject Scientific Research Methodology (MIC, for its Spanish equivalent) provides the necessary elements for their understanding. It is important to take into account whether the student possesses the academic skills required to achieve success in college.

Study habits are the accumulation of periodic actions, of routine activities used to study focused on the achievement of learning. For an adequate development of the teaching-learning process, it is necessary to acquire study habits, which must be generated progressively and recurrently to create the routine. For its formation it is necessary that there are clear objectives of what is intended to be achieved, the student's motivation, the resources available, the purpose and orientation of the study should be added, since individual commitment is required [1].

Good study habits are acquired with responsibility and commitment. Personal motivation, willpower, commitment and discipline are fundamental to generate them [2]. Higher education requires instruments to assess the way in which university students acquire disciplinary knowledge and to explain the different ways they approach, plan and respond to educational experiences in order to achieve academic success [3]. Hence the need for constant evaluation of the teaching-learning process and as a starting point the identification of students' learning styles [4] and [5].

The theory of learning styles is based on the characteristics of people to process information, where each individual has a preferred way or style of assimilating new knowledge. This concept has been studied by several authors, most notably David Kolb (1984) [6], who developed a model of experiential learning, with four learning styles: accommodative, divergent, assimilative and convergent. These styles were modified by Honey-Mumford into active, reflective, theoretical and pragmatic, respectively [7].

The four learning styles proposed in the CHAEA are: active, which includes people who engage with new experiences, get carried away by events, and tend to act first and think about the consequences later. Reflective, which includes people who are observant, analyze their experiences from different perspectives, and try to collect data and analyze them in detail before reaching a conclusion. Theoretical, which corresponds to people who adapt and integrate their observations into complex and logically well-founded theories, analyze and synthesize information and their value system prioritizes logic and rationality and pragmatic, which includes people who try out new ideas, theories and techniques,

and try to test whether they work in practice and they dislike long discussions on the same topic as they are practical and attached to reality [8].

University students are characterized by presenting characteristics of the four learning styles, to a greater or lesser extent. Ideally, all four styles should be strengthened in order to learn effectively. The application of several styles positively influences academic performance [9]. Table 1 presents research conducted on learning styles in engineering careers with the use of the Honey-Alonso questionnaire of learning styles (CHAEA).

Table 1. Research on learning styles in engineering careers.

Country	Study	Subjects	Active	Reflective	Theoretical	Pragmatic
Colombia	Gravini [10]. (2008)	Industrial engineering	12,50	51,78	8,93	16,7
Argentina	Laugero, et al (2009) [11].	Engineering (Mechanical, Electrical/Metallurgy, Industrial and Electronics)	11.75	14,34	12.80	12.97
México	Aragón y Jiménez (2009) [12].	Computer Systems Engineering	20	31,8	11,4	22,4
	Morales-Ramírez et al. (2012) [13].	Computer and Administrative Informatics Engineering	12,53 11,94	14,16 13,55	12,97 12,17	13,74 13,50
	Ortiz y Canto (2013) [14].	Computer Systems Engineering, Industrial Engineering, Electromechanical Engineering	11.21	14.44	12.36	12.44
Colombia	Acevedo et al. (2015) [15]	School of Engineering	11,0	12,9	11.7	12,2
Perú	Ríos (2019) [16].	Geological, Metallurgical, Mining, Economic, Statistical, Chemical and Textile Engineering.	12,6	41,7	31,7	14,0

Perú	Alburquerque (2020) [17].	Electrical Engineering, Electronics, Telecommunications	12 11 14	11 11 5	21 21 22	15 14 17
Colombia	Bolaños et al. (2020) [18].	Industrial Engineering	12,1	14,5	13,3	13,3
Ecuador	Torres et al. (2021) [19].	Systems Engineering	15,79	15.27	12,45	16,51
Peru	Cruz et al. (2022) [9].	Civil Engineering and Food Industries	12,71	15,72	14,64	14,62

Studying and evaluating learning styles allows the formulation of adjustments in teaching strategies according to individual particularities, in search of better results in terms of quality in the teaching-learning processes [20].

Based on the information provided by the questionnaire about learning styles, the teacher can make decisions aimed at improving university learning, can personalize teaching and design effective learning strategies [14]; [19], can make modifications in the programs of the subjects or major academic changes such as the introduction of new teaching methodologies [21].

Project-based learning is a methodology that is developed in a collaborative manner that confronts students with situations that lead them to propose proposals for a given problem [22].

PBL is an innovative teaching option, where students, in addition to learning significantly, develop essential skills, venture into the field of research and provide answers to real problems through a final product [23].

The objective of this reaserch is to present a project-based learning proposal for the Methodology of Scientific Research subject at the Computer Science Engineering course, taking into account the learning styles of the group and the areas of opportunity identified to contribute to the improvement of the students' study habits.

This research is the result of the institutional project: Strategy for the development of study habits in the formation of Computer Science Engineering students. It is derived from the cooperation agreement signed by the National Polytechnic Institute, with the participation of the Higher School of Mechanical and Electrical Engineering, Culhuacán Unit, Mexico and the University of Informatics Sciences, Cuba.

Material and methods

A descriptive, cross-sectional, purposive sampling study was carried out. Theoretical methods were applied: historical-logical analysis and the analytical-synthetic one, which allowed systematizing and interpreting the results according to the theoretical references consulted.

In empirical methods, the Honey-Alonso questionnaire of Learning Styles (CHAEA) was used as a diagnostic instrument [24] to identify and establish the level of learning style preference in students. This questionnaire consists of 80 dichotomous response items: positive (+) if agree or negative (-) if disagree. The authors of this questionnaire were able to identify 20 questions for each style, in correspondence with their specific or particular characteristics.

Based on the results obtained with the average achieved in each style, the Honey-Alonso diagram is elaborated. This is a widely used instrument which was validated in the Spanish-speaking university context [3]; [9]; [21]; [25].

The information was collected by processing the individual questionnaires in a Microsoft Excel spreadsheet. Statistical processing was performed by analyzing simple frequencies and their percentage expression. The results are shown in tables and figures.

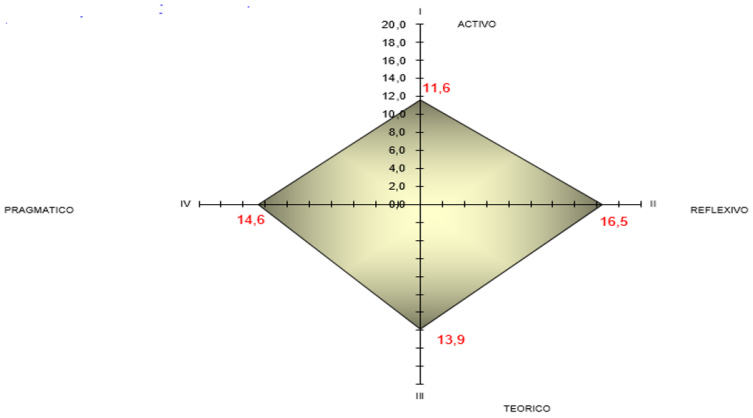
The students from group 2201 of the Computer Science Engineering course at the University of Informatics Sciences, 28 students in total, 8 female and 20 male, were selected as the unit of study. The Iadov technique was used to check the level of satisfaction of the students about the PBL applied to the subject Scientific Research Methodology.

Results and discussion

Table 2 shows the results of the diagnosis of the students' learning styles. The representation is shown in Figure 1.

Table 2. Results of the diagnosis of students' learning styles.

	I Active style	II Reflective style	III Theoretical style	IV Pragmatic style
FA	324	463	390	408
FP	11,6	16,5	13,9	14,6



Graph 1. Results of the diagnosis of the students' learning styles.

The average score of the CHAEA was active learning style: 11.6, reflective style: 16.5, theoretical style: 13.9 and pragmatic style: 14.6. This tendency allows identifying receptive, analytical students, who prefer the application of the ideas learned in the classroom. This is valuable information for teachers who should take these characteristics into account when selecting the most appropriate teaching methodologies. The active style has the lowest score.

For the correct interpretation of the information obtained in the CHAEA questionnaire, [26] it is important to take into consideration that the values should not be analyzed in an absolute manner, since it does not mean the same even when the score acquired in different styles is identical. Their interpretation should be made using a scale developed on the basis of practical experience, grouping the results by sections to which a qualitative classification is assigned, following the suggestions of Honey and Mumford (1986) [27].Table 3 shows the general scale of learning style preference proposed by Alonso.

Table 3. General scale of learning style preference proposed by Alonso.

Learning style	Preference				
	Very low	Low	Moderate	High	Very high
Active	0-6	7-8	9-12	13-14	15-20
Reflective	0-10	11-13	14-17	18-19	20
Theoretical	0-6	7-9	10-13	14-15	16-20
Pragmatic	0-8	9-10	11-13	14-15	16-20

The results obtained using the scales proposed by Alonso show that in the active style there are four students with a score below 9. In the reflective style there is one student with a score below 14, in the theoretical style there are two students with a score below

10 and in the pragmatic style all students have a score above 10. It is shown that most of the sampled Computer Science Engineering students showed a moderate level of preference in all learning styles, which can be translated as there is little difference in relation to students' preference levels and some of them have more than one predominant learning style.

The results obtained about the predominant learning style coincide with the results reported by [5]; [9]; [10]; [11]; [12]; [13]; [14]; [15]; [16] and [18]. The results attained through the study about the preferred order of learning styles coincide with the results reported by [9]; [12]; [14] and [15]. There is no coincidence with the results reported by [17] and [19] regarding the preference for the reflective style in first choice. It is possible that the differences in the results are due, in part, to context and personality characteristics of the students.

The challenge assumed by the teacher goes beyond teaching the students, it involves responding to multiple demands, that is why a variety of methodological strategies that strengthen the four learning styles will sometimes be necessary, so that all students can be assisted according to their preferences in the way they learn.[28].

Based on these results, PBL is applied in the subject Scientific Research Methodology. This subject has a total of 32 hours and is taught in the Computer Science Engineering course.

Systematic evaluations: Application of written and oral questions in each face-to-face meeting that favors the evaluation of contents. Practical classes and seminars are required for the analysis and resolution of exercises and/or case studies. Workshops are planned to encourage the analysis of the proposed solutions.

Partial evaluations: Extra-class work that relates the theoretical-methodological design of a research project with the final work of the subject Software Engineering (ISW, for its Spanish equivalent). Articulation of contents between the subjects Software Engineering 1 (IS1) and Subsystems of Organizations (SUBO, for its Spanish equivalent) and Scientific Research Methodology.

Final evaluation: Final workshop where an integrative project is presented.

At the beginning of the course, students are asked to carry out a project, which they must develop throughout the academic semester, in which they must apply the theoretical concepts discussed in class. Students have several options related to the s solve a specific problem, or the professor can suggest research projects that are election of such project: they can choose it according to their interests in the subject developed in the to groups

and research lines of the program or problems that a certain

They are offered proposals of topics for the project of Software Engineering I and Scientific Research Methodology: System for the control of the materials of professors and students of the Vice-Deanship of Administration. System for the management of educational projects of the teaching brigades. Fixed Asset Management System. System for the management of planning and control of the student-worker guard. System for the management of the student residence. System for the management of union processes. System for the management of disciplinary processes, among others.

The working group for each classroom project plans, organizes, develops the guided work and presents the results in written and oral form. The groups are formed by two or three students, depending on the chosen project. The project is evaluated systematically, partially and finally.

Phases for the implementation of Project Based Learning according to the identified areas of opportunity:

1. Initial phase:

Selection of the topic: related to reality (general attitude towards the study).

Review of contents: The same that are within the curriculum of the subject. (Study techniques)

Group formation: Distribution of collaborative groups determining the roles for each student (General attitude towards study).

Establishment of activities: Spaces, time and resources necessary to help and guide the students' work (Work plan).

Type of production to be developed: Modality of the project.

Establishment of objectives: Describe the objectives of the project which should be clear, precise, possible to fulfill and awaken the interest of the students. (General attitude towards the study).

2. Development phase

Search and collection of information: Students will research all information regarding the proposed topic (Study techniques).

Analysis and synthesis of the information: Students will share all researched in which they will analyze the information gathered. (Study techniques)

Production: Students will apply what they have learned and begin to produce their research work according to their creativity (Study techniques).

3.Final Phase

Presentation: In this phase the formal presentation of the entire project will take place.

Evaluation: Formative type evaluation using a competency based rubric.

Reflection: Reflecting on the significance, failures and mistakes during the execution of the process (general attitude towards the study) [29] and [30].

Theoretical-methodological requirements that should characterize the activities or tasks of a teaching-learning process, based on projects as its didactic strategy:

To foresee a first moment of reflection oriented to the identification of problems of the environment linked to the content object of learning (general attitude towards the study).

To contemplate the link between theory and practice (to predict the possibility of taking the knowledge and skills acquired to the closest reality) (General attitude towards study).

An active role is assigned to the student: he/she is the one who identifies the problem that will be the object of research and who proposes his/her possible ways of approaching to solving it. (General attitude towards the study).

It is accompanied by levels of help elaborated by the teacher, which are provided to the student depending on his characteristics and needs (General attitude towards study).

The use of knowledge from different subjects is stimulated, seeking an analysis of the problem with an interdisciplinary approach (Study techniques).

Action plans are structured to address the identified problem with the distribution of individual and collective tasks and responsibilities, promoting both independent and cooperative learning (Work plan).

A follow-up, control and feedback action is planned for the different stages of the process, which stimulates a formative evaluation (Work plan).

The presentation of the best projects in some kind of scientific-student activity is foreseen, the teacher should coordinate with the institution's directors, the development of a "products and solutions Fair" or another type of activity that involves not only teachers and students, but also parents and community. (General attitude towards the study) [22].

The teacher plays the role of mediator, gives recommendations, formulates questions, helps the group in the decision-making process and allows students to develop their task independently.

At the end of the semester, the Iadov Technique was applied to evaluate students satisfaction level with the PBL methodology applied in the Scientific Research Methodology course.

The Iadov technique constitutes an indirect way to study satisfaction, since the criteria used are based on the relationships established between the three closed questions, which are interspersed within a questionnaire and whose relationship is unknown to the respondent [31].

In this case they are questions 2, 4 and 7. These three questions are related through what is called the "Iadov Logic Chart". The group satisfaction index (ISG, for its Spanish equivalent) is expressed on a numerical scale ranging from +1 (maximum satisfaction) to -1 (maximum dissatisfaction). To obtain it, different levels of satisfaction were determined as shown in the following formula:

$$\mathrm{ISG} = \frac{\mathrm{A}(+1) + \mathrm{B}(+0.5) + \mathrm{C}(0) + \mathrm{D}(-0.5) + \mathrm{E}(-1)}{\mathrm{N}}$$

In this case A, B, C, D and E are the number of respondents placed, respectively, in satisfaction positions 1; 2; 3 or 6; 4 and 5, and N is the total number of respondents.

The factors used have the meaning: values of the coefficients of the Iadov technique for group satisfaction: (+1) Maximum satisfaction, (0.5) Satisfied, (0) Not defined, (-0.5) Dissatisfied, (-1) Maximum dissatisfaction.

The results are shown in Table 3 for the Iadov Technique.

Table 3. Results of Iadov's Technique

Clear Satisfaction	More satisfied than dissatisfied	Not defined	More dissatisfied than satisfied	Clear Dissatisfaction
25	3	0	0	0

Number of students (N = 28)

On the application of the PBL, 28 students responded, with a group satisfaction index:

$$\mathrm{ISN} = \frac{25(+1) + 3(+0.5) + 0(0) + 0(-0.5) + 0(-1)}{28} + \frac{26.5}{28} = 0.95$$

The result was (0.95) which demonstrates the high degree of satisfaction declared by the students with the application of the PBL. The open-ended questions (3 and 6 of the survey) made it possible to delve deeper into the nature of the causes that led to the different levels of satisfaction.

The aspects that the participants liked the most were: the level of commitment achieved, the evaluation of the semester subjects in an integrative project, they consider this type of learning important to acquire a valuable professional experience and the development

of skills, the favorable disposition to face the project during the course, the application of the knowledge covered in class as well as the cooperation and collaboration among the team members. They also refer that it is a pleasant learning experience, better academic performance, deeper understanding of the subject matter, lower levels of stress and anxiety, higher motivation, better ability to see situations from other perspectives, more positive and mutually supportive relationship with peers, better attitude towards the subject matter, and a good connection with the real world.

The aspects that the participants disliked the most were: the workload, some students did not collaborate actively in the group, but gained all the benefits of the evaluation by the team work in the project, the team work is shared, but it is not divided equally between all the members, some are more overloaded than others, so the team work competence should be improved.

Further research is needed to corroborate the preference and evolution of learning styles in various years of professional training in computer science engineering and the application of other methodologies that enhance their development.

Conclusions

The study showed that the diagnosis of learning styles constitutes a valuable resource that enriches the orientation of teaching in terms of diversity and improvement of learning. The results of the diagnosis of learning styles were: active styles: 11.6, reflective styles: 16.5, theoretical styles: 13.9 and pragmatic styles: 14.6. The reflective style predominates, people who are observers, analyze their experiences from different perspectives and try to collect data and analyze them in detail before reaching a conclusion. The active style has the lowest score. With the insertion of PBL, students were directed to the leading role in the construction of their learning by declaring them active subjects in the TLP of the subject MIC. They were encouraged to learn to face the style of work they will need in their future professional practice.

The level of student satisfaction with the use of project-based learning in the subject Research Methodology, as a way of encouraging study habits, was high.

Bibliographic references

1. Farro LM. Hábitos de estudio y estrés académico virtual en estudiantes en la escuela de la Policía Nacional del Perú, Chiclayo (Tesis maestría). Universidad César Vallejo; 2022. Disponible en: https://repositorio.ucv.edu.pe/handle/20.500.12692/80183

2. Tucto SD y Terry SG. Hábitos de estudio y aprendizaje autorregulado en estudiantes universitarios. Revista Educa. 2021; 17: 121–133. Disponible en: https://dialnet.unirioja.es/servlet/articulo?codigo=8083934
3. Juárez C R Propiedades psicométricas del cuestionario Honey - Alonso de estilos de aprendizaje (CHAEA) en una muestra mexicana. Revista De Estilos De Aprendizaje. 2014; 7(13): 136-154. Disponible en: https://doi.org/10.55777/rea.v7i13.1011
4. Castellote JM Teaching systems in occupational medicine. European Journal of Investigation in Health, Psychology and Education. 2019; 9(1): 31-37. Disponible en: https://dialnet.unirioja.es/servlet/articulo?codigo=7109641
5. Mena JL, Rodríguez-Pulido J, Mena JA, Navarro-Guzmán JI, Cabrera-Guzmán JS. Estilos de aprendizaje del alumnado de ingeniería: curso, rendimiento y género. European Journal of Education and Psychology. 2019; 12(2): 175-189. Disponible en: https://www.redalyc.org/journal/1293/129365934006/html/
6. Kolb D. Experiential learning experiences as the source of learning development. Nueva York: Prentice Hall; 1984.
7. Alves P, Miranda L, Morais C, Melaré D. Estilos de aprendizaje de los estudiantes de la educación superior y el acceso a las herramientas de entornos virtuales. Tendencias Pedagógicas. 2018; 31: 69-82. Disponible en: https://doi.org/10.15366/tp2018.31.003
8. Alonso, C, Gallego, D, y Honey, P. Los estilos de aprendizaje. Procedimientos de diagnóstico y mejora. 8ª ed. Bilbao: Mensajero; 2012.
9. Cruz Sánchez TH, Gomero Mancesidor JM, Jamanca Gonzales NC, Tosso LH. Relación de preferencias en estilos de aprendizaje con el rendimiento académico de los estudiantes universitarios de ingeniería. Alpha Centauri. 2022; 3(1): 2–14. Disponible en: https://doi.org/10.47422/ac.v3i1.70
10. Gravini ML. Estilos de aprendizaje de los estudiantes de primer semestre de los programas de Psicología e Ingeniería Industrial de la Universidad Simón Bolívar de Barranquilla. Psicogente. 2008; 11(19): 24-33. Disponible en: https://doi.org/10.17081/psico.11.19.2686
11. Laugero L, Balcaza G, Salinas N, Cravari AM. Una indagación en el Estilo de Aprendizaje de los Alumnos en Distintos Momentos de su Vida Universitaria. Revista Estilos de Aprendizaje. 2009; 4(4): 1-13. Disponible en: https://revistaestilosdeaprendizaje.com/article/view/892

12. Aragón M, Jiménez YI. Diagnóstico de los estilos de aprendizaje en los estudiantes: Estrategia docente para elevar la calidad educativa. Instituto de Investigaciones en Educación. Universidad Veracruzana. Revista de Investigación Educativa. 2009; 9: 1-21. Disponible en: https://cpue.uv.mx/index.php/cpue/article/view/73
13. Morales-Ramírez A, Alviter-Rojas LE, Hidalgo-Cortés C, García-Lozano RZ, Molinar-Solís JE. Estilos de aprendizaje en estudiantes universitarios de Ingeniería en Computación e Informática Administrativa. Revista Estilos de Aprendizaje. 2012; 9(9): 156-168. Disponible en: https://revistaestilosdeaprendizaje.com/article/view/953
14. Ortiz AF, Canto PJ. Estilos de aprendizaje y rendimiento académico en estudiantes de ingeniería en México. Revista de estilos de aprendizaje. 2013; 6(11). Disponible en: https://doi.org/10.55777/rea.v6i11.978
15. Acevedo D, Cavadia S, Alvis A. Estilos de Aprendizaje de los Estudiantes de la Facultad de Ingeniería de la Universidad de Cartagena (Colombia). Formación universitaria. 2015; 8(4): 15-22. Disponible en: https://dx.doi.org/10.4067/S0718-50062015000400003
16. Ríos LE. Estilos de aprendizaje en los estudiantes de diversas carreras profesionales en una universidad pública de Lima Metropolitana (Tesis de maestría). Universidad Peruana Cayetano Heredia; 2019. Disponible en: https://repositorio.upch.edu.pe/handle/20.500.12866/6594
17. Alburquerque AL. Diseño de metodología de enseñanza de acuerdo a los estilos de aprendizaje predominante en estudiantes universitarios de los tres primeros ciclos de las carreras de Ingeniería eléctrica, Electrónica y Telecomunicaciones de la FIEE-UNI (Tesis de maestría). Universidad Antonio Ruiz de Montoya; 2020. Disponible en: https://repositorio.uarm.edu.pe/items/e53ae837-4c69-43f1-9233-28c5043f412d
18. Bolaños W, Sandoval E, Lasso LA. Caracterización de los estilos de aprendizaje de estudiantes de Ingeniería Industrial de la UCEVA – Colombia. Revista espacios. 2020; 41(44): 171-183. Disponible en: http://w.revistaespacios.com/a20v41n44/a20v41n44p13.pdf
19. Torres OX, Granda MA, Sierra CM, Yancha MM. Curso de emprendimiento en los estudiantes de la carrera de ingeniería de sistemas de Uniandes Ecuador: estilos de aprendizaje y rendimiento académico. Revista Universidad y Sociedad. 2021; 13(4): 161-169. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2218-36202021000400161&lng=es&tlng=pt

20. Gutiérrez-Tapias M. Estilos de aprendizaje, estrategias para enseñar. Su relación con el desarrollo emocional y aprender a aprender. Tendencias Pedagógicas. 2018; 31: 83-96. Disponible en: https://doi.org/10.15366/tp2018.31.004
21. Freiberg-Hoffmann A, Abal F, Fernández-Liporace M, Honey-Alonso P. Learning Styles Questionnaire: New psychometric evidences in Argentinean population. Acta Colombiana de Psicología. 2020; 23(2): 328-338. Disponible en: http://doi.org/10.14718/ACP.2020.23.2.13
22. Zambrano Briones MA, Hernández Díaz A, Mendoza Bravo KL. El aprendizaje basado en proyectos como estrategia didáctica. Revista Conrado. 2022; 18(84): 172-182. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1990-86442022000100172
23. Villalobos-Abarca MA, Herrera-Acuña RA, Ramírez IG, Cruz XC. Aprendizaje Basado en Proyectos Reales Aplicado a la Formación del Ingeniero de Software. Formación universitaria, 2018; 11(3): 97-112. Disponible en: https://dx.doi.org/10.4067/S0718-50062018000300097
24. Alonso C, Gallego D, Honey P. Cuestionario Honey-Alonso de Estilos de Aprendizaje (CHAEA). Bilbao, España: Mensajero; 2004. Disponible en: https://www.cua.uam.mx/pdfs/coplavi/s_p/doc_ng/test-de-estilos-deaprendizaje.pdf
25. Altamirano-Droguett J, Araya-Crisóstomo S, Paz-Contreras M. Learning styles and academic performance of Obstetrics' students. Revista Ciencias de la Salud. 2019; 17(2): 276-292. Disponible en: https://doi.org/10.12804/revistas.urosario.edu.co/revsalud/a.7937
26. Alonso C, Gallego D, Honey P. Los estilos de aprendizaje. Procedimiento de diagnóstico y mejora. 3ª ed. Bilbao, España: Mensajero; 1997.
27. Honey P, Mumford A. The Manual of Learning Styles. 2da edic. Estados Unidos: Peter Honey Associates; 1986
28. Gallego DJ, Alonso C, Melare D. Estilos de Aprendizaje y Estilos de Enseñanza. Propuestas pedagógicas para la transformación de la educación. Revista De Estilos De Aprendizaje. 2022; 15(Especial): 1–4. Disponible en: https://doi.org/10.55777/rea.v15iEspecial.5309
29. Lloscos-Audi M. La metodología basada en proyectos: una solución innovadora para afrontar los cambios sociológicos del siglo XXI. (Tesis de Maestría). Universidad Internacional de La Rioja; 2015. Disponible en: https://reunir.unir.net/handle/123456789/3401

30. Malpartida-Márquez JD. Efecto del aprendizaje basado en proyectos en el logro de habilidades intelectuales en estudiantes del curso de contabilidad superior en una universidad pública de la región Huánuco. (Tesis de Maestría). Universidad Peruana Cayetano Heredia; 2018. Disponible en: https://hdl.handle.net/20.500.12866/1515
31. López A, González V. La técnica de Iadov. Una aplicación para el estudio de la satisfacción de los alumnos por las clases de educación física. Revista Digital-Buenos Aires. 2002; 8(47). Disponible en: http://www.efdeportes.com/efd47/iadov.htm

Contribución de autoría

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No existen conflictos de intereses entre los autores, ni con otras instituciones, académicas, científicas, empresariales o de otra índole.

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