RGSA – Revista de Gestão Social e Ambiental
ISSN: 1981-982X
Submission date: 06/14/2024
Acceptance date: 08/16/2024
DOI: https://doi.org/10.24857/rgsa.v18n10-113
Organization: Interinstitutional Scientific Committee
Chief Editor: Ana Carolina Messias de Souza Ferreira da Costa
Assessment: Double Blind Review pelo SEER/OJS

INNOVATION AND COMPETENCES IN HIGHER EDUCATION INSTITUTION: A PROPOSAL FOR IMPROVEMENT

Marina Carrasco-Acosta[1]
Mónica Guerra-Santana[2]
Josefa Rodríguez-Pulido[3]
Pilar Garcia-Jimenez[4]

ABSTRACT

Objective: The aim of this proposal is to ensure that students develop the cognitive skills of analysis, reflection, relation and consolidation of part of the content of the subject Marine Pollution of the Degree in Marine Sciences of the University of Las Palmas de Gran Canaria (Spain), without forgetting the skills of communication.

Theoretical Framework: Nowadays, there is a wide range of teaching tools available for specific purposes, and the teacher's choice depends on several factors related to the subject to be developed, the type of students and the resources available in the higher education institution.

Method: This study proposes a practice of educational innovation based on experience. The methodology to be used is the Kolb Cycle and the seminar, evaluating the experience through Learning Oriented Assessment (LOA) and a self-satisfaction survey of the experience developed to be completed by the students.

Results and Discussion: The implementation of this pedagogical proposal is expected to improve students' autonomous learning, qualifications and the acquisition of the different competences of the subject under study.

Research Implications: The practical and theoretical implications of this pedagogical proposal are discussed, providing information on how the results will improve the cognitive competences of analysis, reflection, relation and consolidation of part of the content of the subject under study.

Originality/Value: This study contributes to the literature by providing an innovative, feasible and relevant pedagogical proposal for competence development in higher education.

Keywords: Higher Education Institution, Seminar, Marine Sciences, Kolb Cycle, Learning Oriented Assessment.

INOVAÇÃO E COMPETÊNCIAS EM INSTITUIÇÕES DE ENSINO SUPERIOR: UMA PROPOSTA DE APRIMORAMENTO

RESUMO

Objetivo: O objetivo desta proposta é garantir que os alunos desenvolvam as habilidades cognitivas de análise, reflexão, relação e consolidação de parte do conteúdo da disciplina Poluição Marinha do curso de Licenciatura em Ciências Marinhas da Universidade de Las Palmas de Gran Canaria (Espanha), sem esquecer as habilidades de comunicação.

[1] Instituto Universitario de Estudios Ambientales y Recursos Naturales (i- UNAT), Universidad de Las Palmas de Gran Canaria, Las Palmas, España. E-mail: marina.carrasco@ulpgc.es
Orcid: https://orcid.org/0000-0002-7298-5457
[2] Universidad de Las Palmas de Gran Canaria, Las Palmas, España. E-mail: monica.guerra@ulpgc.es
[3] Universidad de Las Palmas de Gran Canaria, Las Palmas, España. E-mail: josefa.rodriguez@ulpgc.es
[4] Instituto Universitario de Estudios Ambientales y Recursos Naturales (i- UNAT), Universidad de Las Palmas de Gran Canaria, Las Palmas, España. E-mail: pilar.garcia@ulpgc.es
Orcid: https://orcid.org/0000-0002-4732-0381

Referencial Teórico: Atualmente, há uma grande variedade de ferramentas de ensino disponíveis para fins específicos, cuja escolha pelo professor é determinada por vários fatores relacionados à matéria a ser desenvolvida, ao tipo de alunos e aos recursos disponíveis na instituição de ensino superior.

Método: Este estudo propõe uma prática de inovação educacional baseada na experiência. A metodologia a ser utilizada é o ciclo de Kolb e o seminário, avaliando a experiência por meio da Avaliação Orientada para a Aprendizagem (LOA) e de uma pesquisa de autossatisfação sobre a experiência desenvolvida a ser preenchida pelos alunos.

Resultados e Discussão: Espera-se que a implementação dessa proposta educacional melhore a aprendizagem autônoma dos alunos, suas qualificações e a aquisição das diferentes competências da disciplina em estudo.

Implicações da Pesquisa: As implicações práticas e teóricas dessa proposta educacional são discutidas, fornecendo informações sobre como os resultados melhorarão as competências cognitivas de análise, reflexão, relação e consolidação de parte do conteúdo da disciplina em estudo.

Originalidade/Valor: Este estudo contribui para a literatura ao apresentar uma proposta educacional inovadora, viável e relevante para o aprimoramento de competências na instituição de ensino superior.

Palavras-chave: Instituição de Ensino Superior, Seminário, Ciências Marinhas, Ciclo de Kolb, Avaliação Orientada para a Aprendizagem.

INNOVACIÓN Y COMPETENCIAS EN LA INSTITUCIÓN DE EDUCACIÓN SUPERIOR: UNA PROPUESTA DE MEJORA

RESUMEN

Objetivo: El objetivo de esta propuesta es lograr que el estudiantado desarrolle las competencias cognitivas de análisis, reflexión, relación y consolidación de parte de los contenidos de la asignatura de Contaminación Marina del Grado en Ciencias del Mar de la Universidad de Las Palmas de Gran Canaria (España), sin olvidarse de las competencias en habilidades comunicativas.

Marco Teórico: En la actualidad se dispone de una extensa batería de herramientas didácticas con finalidades concretas, cuya elección como docente viene dada por varios factores relacionados con la materia a desarrollar, el tipo de alumnado y los recursos disponibles en la institución educativa superior.

Método: Este estudio propone una práctica de innovación educativa basada en la experiencia. La metodología a emplear son el ciclo de Kolb y el seminario, evaluando la experiencia mediante Evaluación Orientada al Aprendizaje (EOA) y un autoinfome de satisfacción sobre la experiencia desarrollada a cumplimentar por el alumnado.

Resultados y Discusión: Se espera que la implementación de esta propuesta educativa mejore el aprendizaje autónomo del alumnado, las calificaciones y la adquisición de las diferentes competencias propias de la materia objeto de estudio.

Implicaciones de la investigación: Se discuten las implicaciones prácticas y teóricas de esta propuesta educativa, proporcionando información sobre cómo los resultados mejorarán las competencias cognitivas de análisis, reflexión, relación y consolidación de parte de los contenidos de la asignatura objeto de estudio.

Originalidad/Valor: Este estudio contribuye a la literatura al proporcionar una propuesta educativa innovadora y viable, así como relevante en cuanto a la mejora de competencias en la institución de educación superior.

Palabras clave: Institución de Educación Superior, Seminario, Ciencias del Mar, Ciclo de Kolb, Evaluación Orientada al Aprendizaje.

1 INTRODUCTION

The implementation of innovative tools in the institution of higher education leads to a paradigm shift in the academic activity of the same, replacing in certain cases the traditional pedagogical practices (expository methodology) and implementing the participatory character of the student and the new evaluation processes. These innovative methodologies involve an important effort on the part of teachers, since it entails a deliberation on the educational paradigm from which the teaching work is desired, that is, the processes and the management of student learning (Noguera, 2006; Gallargo & Reyes, 2018). The choice of the tools (Kolb cycle, flipped-class, etc.) and their strategies is based not only on the elements of the curriculum design, but on other factors, such as the contents of the subject we intend to develop, the competences to be acquired by the students, the expected learning results, the type of students, the number of students and the didactic resources available, among others.

In this case, we intend, with the implementation of the Kolb cycle, in the seminars of the subject of Marine Pollution of the Degree in Marine Sciences of the University of Las Palmas de Gran Canaria (ULPGC) of Spain, that students establish links between the need for knowledge, for their academic and professional training, allowing them to relate the contents of this subject, of a transversal nature, with other subjects of this university degree. We understand that biological contents and concepts are best contextualized with the practical application of them.

Therefore, we consider the proposed proposal of interest, since through the implementation of innovative strategies students must face the contents from a practical point, rescuing from their experience concepts, perhaps forgotten, and relating these same with specific contents of the subject. In this way, the students strengthen the contents, acquire the competences and are protagonists of their learning, with the constant presence of the teacher, where he will exercise a guiding role in the learning process.

2 THEORETICAL FRAMEWORK

The European Higher Education Area (EHEA) proposes the introduction of new methodological models for student learning, in response to the need to develop new competences such as critical thinking, conflict resolution and reflective decision-making (Imbernon & Medina, 2008; UNESCO, 2015). This situation causes university professors to propose teaching methodologies where their role is as a mediator, which favors the autonomous

learning of students (Bonals & Sánchez, 2007; Sánchez, 2015), and leaves behind the traditional role of mere transmitter of knowledge. The application of one or the other or the conjugation of several of these methodologies is based on the self-reflection of teachers, who must question what they want to do and what they want to achieve with their teaching dynamics (Noguero, 2006; Philp-Clark & Grieshaber, 2024).

In general, innovative strategies direct their efforts towards the promotion of transversal skills in students and their involvement in a process that improves their learning, highlighting the Puzzle technique (Aronson, 1978), Co-opco-op or flexible cooperative learning technique (Kagan, 1985), the Kolb cycle (Kolb, 1984), collective intelligence, the seminar, the methodology of triangulation in teaching (MTD) (Manero et al., 2011), or the inverted classroom (Bergmann & Sams, 2012).

Learning is understood to be effective when it focuses on experience, ways to achieve it, and identifying individual learning styles. The Kolb model combines learning, analysis of results and reflection with concrete experience and will allow conclusions to be drawn and future orientations to be defined. This model is based on four stages based on i) experimentation; ii) reflection, on what has been experienced and open debate among experimentation participants; iii) conceptualization; and iv) the application of new notions to solve new problems. To complete the understanding of the knowledge, both scientific and technical, exposed in the classes, the seminars are presented as another didactic strategy (Nuñez, 2006; Reyes, 2016; Pasco-Dalla-Porta et al., 2024), and are developed with a double purpose. On the one hand, they are used for the resolution or discussion of ideas, and, on the other hand, for the sharing of a work to reinforce the knowledge of students (Saroyan & Amundsen, 2023).

Consequently, learning based on the combination of the Kolb cycle and the seminar allows university students to consolidate, expand, deepen, discuss and integrate content, facilitating the resolution of tasks and developing, in turn, the oral expression of students, the logical ordering of content and the acquisition of skills in the use of different sources of knowledge.

3 METHODOLOGY

3.1. MARINE POLLUTION: CURRICULUM ELEMENTS

Marine Pollution consists of 6 credits divided equally between the areas of knowledge of biology and chemistry. The face-to-face activity in the area of biology is divided into 11.5

hours of theory, 9.5 hours of practical laboratory classes and 9 hours of classroom for group work. Specifically, the implementation of the experience will be carried out during 6 hours, from 9 hours for classroom sessions for group work. Within these 6 hours, the contents corresponding to organisms that indicate fecal pollution will be treated; the analysis of the quality of beaches; and, the methods of analysis taught and worked during the practical sessions.

The transversal, nuclear and specific competences required, through the development of experience, are the acquisition of skills in information management; problem solving; effective oral and written communication; teamwork; the recognition and proposal of control tools in the face of problems of marine pollution; or, the training of students for the interdisciplinary modeling of environmental impact and quality studies.

The specific objectives established in the teaching project are the acquisition of basic knowledge about the types of pollutants that impact the marine environment, and their nature; the review of biological processes that lead to the alteration or degradation of pollutants in the marine environment; and, the contribution of knowledge about European legislation for the monitoring and control of Water Quality.

3.2. CONDUCT OF MEETINGS

The proposed experience to implement in the 6 hours of classroom (Table 1) for group work that corresponds to Marine Pollution-Biological Aspects, is developed in three sessions of two hours each (10% of the final grade of the subject).

The first session, based on the Kolb cycle (Kolb, 1984), is timed in two hours with four distinct stages. The teaching role consists in developing the exposition of the contents of the topic and the explanation on how to proceed to work on the subject (Kolb, 1984). The objective of the experimentation stage is to guide students towards the introduction of water quality contents in marine environments. The total duration is ten minutes and the student takes an active role, while the teacher has a role of stimulator of participation. For the development of experimentation we present students with a collection of images, where each one is displayed for twenty seconds. For example, we present the collection of images of a wastewater treatment plant (E.D.A.R.); a natural swimming pool; an intertidal area colonized by green algae; a coastal discharge of wastewater; a plaque culture of a bacterium; and a warning panel of prohibited bathing.

The objective of the reflection stage (second stage) is to establish connections between biological concepts and what is observed and/or commented upon. The role of the teacher is

the driver of the debate, guiding the course of it and promoting new issues. Students have the main role in the intervention, since, a debate is developed through the raising of questions, such as, what they can deduce; what they believe are the reasons that have caused the event; where it has occurred; or, what type of regulation regulates the event. This reflection, in turn, allows a diagnostic evaluation of previous knowledge of the class group.

The debate continues with the third stage of conceptualization. The objective of this phase is to provide a theoretical framework from the results of observation and experience. The teacher assumes the main role and the duration of these two stages is estimated at about twenty minutes.

The last phase, of application, aims at structuring the topic around the content treated. It is resolved with the presentation of a scientific-informative document and its reading (15 minutes). This document chosen by the teacher should favor three main topics: bioindicators; regulations, and methodologies and procedures for microbiological identification. Once this activity is carried out by the teacher, the students resume their main role, with a sharing as a storm of ideas of the basic aspects of the article and the key concepts to highlight. The development of the activity is carried out through the annotation (chalkboard or notebook) of the concepts and ideas extracted. The duration is estimated at forty-five minutes.

The first session ends with the organization of students in heterogeneous working groups, composed of five students, in order to promote the benefits of cooperative learning. Each task force is assigned one of the issues raised in the brainstorm. The teacher indicates how to develop an oral presentation (organization of contents, style and time of exposure). It is also stated that each working group must elaborate five questions at the end of the task. These issues will be raised during Question Time in the presentation and discussed at the end of the session. Teachers show that participation in the design and development of the oral presentation, as well as in the proposal of questions, are part of the process of evaluation of the subject. This last part is estimated to last 30 minutes.

As a non-face-to-face work, each student must read, review and analyze the proposed printed resources, in order to subsequently carry out a common understanding among the members of the group and address, in turn, the design of the oral presentation that will be carried out in the second session, which favors discussion and consensus in the classroom. The five issues should be framed in each of the themes corresponding to the remaining groups. They are raised during the question time of each of the themes, and are resolved by the members of the group of the corresponding theme. The preparation of the oral presentations and the drafting of the question paper is done using the material hosted on the Moodle platform of the subject as

didactic resources. The teacher at all times will have a role of support and resolution of doubts that may arise.

In the first fifteen minutes of the second session, the teacher clarifies the aspects to be evaluated in the oral presentation and the weighting of the evaluation criteria contained in the rubric. This information is previously deposited on the Moodle platform so that the working groups know in advance which descriptors will be evaluated in their exposure (Table 2).

The order of presentation of the topics is chosen by lot. Each exhibition has an allotted time of ten minutes. At the end of the exhibition, a turn of questions arises from the doubts raised during the exhibition or those previously written by the other groups. The estimated discussion time is five to ten minutes per group. The exposure of the work will be assessed taking into account three documents (Figure 1). First, the co-evaluation or peer evaluation, by three students outside the group that exposes and randomly chosen, based on the rubric (42%). Second, teacher evaluation using the same heading (21%). Third, the delivery of the document of questions previously written by the group (7%).

At the third meeting (2 h), two parts are established. In the first part, an individual and punctuable questionnaire is made about concepts and aspects treated. The test consists of ten short questions and the duration of the test is one hour (Table 1). A second part analyzes the advantages, limitations, possibilities and confusing issues of the didactic experience carried out. Some of the questions of this sharing are what opinion this innovative experience deserves; what weight these tools would have against the exhibition class; or, you have recognized some improvement in your learning.

This analysis concludes with the elaboration of final conclusions agreed among the students. In the final ten minutes of the session, a satisfaction survey of the developed proposal is proposed, where some of the questions collected are whether the time spent on the experience is excessive, or what degree of interest has aroused the experience developed.

Table 1

Timing of the three sessions that make up the educational innovation proposal.

SESSION 1. Kolb Cycle, Brainstorm and Organization Seminar (2 hours)		
Didactic strategy	Content/Stage/Activity	Duration
Kolb cycle	Presentation of the experience and visualization of the images (experimentation stage).	10’
	Experience development (stages of reflection and conceptualization).	20’
	Vertebration of the content and reading of a scientific-technical document where the topics discussed in the previous stages are collected (application stage).	15’

Storm of ideas	Sharing the basic aspects of the article and the key concepts to highlight.	45’
Seminar	Presentation of the activity and configuration of heterogeneous groups.	30’
SESSION 2. Seminar (2 hours)		
Seminar	Clarification of aspects to be evaluated in the oral presentation by means of rubric.	15’
	Oral group exposure	10’
	Question time and discussion	5-10’
SESSION 3. Content questionnaire of the seminar, sharing of the innovative activities developed and student satisfaction survey (2 hours)		
Seminar Content Questionnaire	Individual and scoring questionnaire, with 10 short questions, on concepts and aspects discussed at the seminar.	60’
Sharing of the activity developed	Analysis of the advantages, limitations and possibilities of the developed proposal.	50’
Satisfaction survey	Survey of satisfaction with the innovative activities carried out.	10’

3.3. EVALUATION

The evaluation of the experience is focused towards a Learning Oriented Evaluation (EOA). All activities are mandatory to access the subject evaluation (Table 2).

Table 2

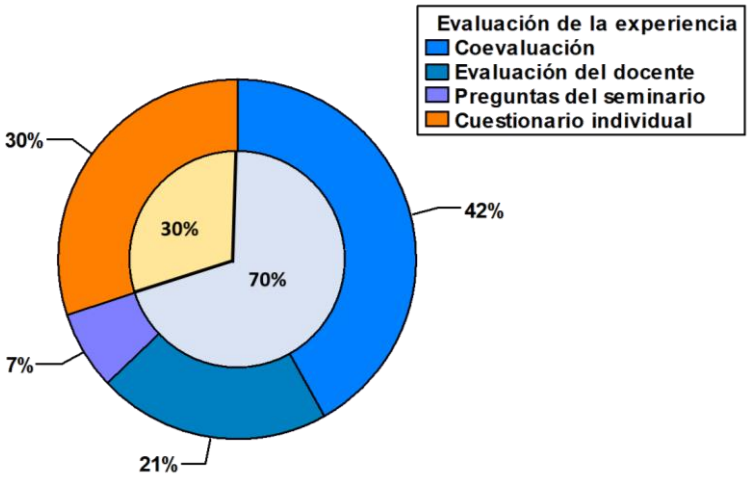
Deliverables of the activities developed throughout the experience.

Didactic strategy	**Evidence**
Session 1: Kolb Cycle, Brainstorm and Organization Seminar	Not applicable
Session 2: Seminar	1. Delivery of the document where the five questions are collected. 2. Delivery of the three items completed by each student-evaluator
Session 3: Seminar Content Questionnaire. Pooling and student satisfaction survey	3. Delivery of the seminar knowledge questionnaire. Delivery of the satisfaction questionnaire (non-evaluable document)

The weighting of the evidence provided by the students is presented in Figure 1. In detail, these percentages are distributed among the tasks developed in the seminar i) co-evaluation or peer evaluation (42%) where each member of the heterogeneous group must deliver to the teacher an evaluation of each of his teammates, where the individual contribution to the work is indicated (the student who does not finish a contribution >50% does not exceed the activity); ii) evaluation of the teacher (21%); and, iii) document compiling the questions of the seminar (7%), evaluating them according to their correct approach and contextualization.

Figure 1

Percentages of evaluation of the proposed didactic experience. In blue the percentage of qualification corresponding to the tasks developed in the seminar (total qualification of these activities = 70%) and in orange the percentage of qualification of the individual questionnaire of 10 questions (total qualification of this activity = 30%) are indicated.



At the same time, 100% of the didactic experience score is distributed: (i) 70% corresponds to the three evaluation documents of the oral presentation carried out during the seminar; and (ii) 30% corresponds to the individual questionnaire of 10 questions and scored between 1-10 points each (Figure 1).

4 REFLECTION

It is expected that the implementation of the proposed experience will optimize the autonomous learning of students, improving, in turn, the qualifications and facilitating the acquisition of the different specific, as well as transversal and nuclear competences typical of the subject of Marine Pollution of the Degree in Marine Sciences of the ULPGC. Likewise, it is expected that the dynamization of the classes and the contextualization in the classroom of practical problems, which resemble those that have arisen in the professional field, will improve learning outcomes.

From the teacher's point of view, these types of experiences are very useful, although they involve more work for the teacher. Under our prism, innovation tools allow students to be more involved in their own learning, discovering what concepts are key and what shortcomings their study system can present.

We believe that the implementation of this proposal for the future in the subject of Marine Pollution of the Degree in Marine Sciences of the ULPGC will enrich in a multitude of aspects both the subject, as well as the students and teachers. Emphasize that we consider it necessary to invest time in the dialog between students and teachers on the planning, content, timing, and development of the learning experience through the use of innovative strategies, as it benefits all stakeholders involved in learning.

ACKNOWLEDGEMENTS

The authors thank the Vice-Rector for Degrees and Lifelong Learning of the University of Las Palmas de Gran Canaria. M.C.-A. thanks the European Social Fund and the Government of the Canary Islands-Ministry of Economy, Knowledge and Employment for the funding of the Catalina Ruiz contract of the program, ULPGC.

REFERENCES

Aronson, E., (1978). The Jigsaw Classroom, Beverly Hills, Sage.

Bergmann, J. & Sams, A., (2012). “Flip your classroom: Reach every student in every class every day.” Eugene, OR: International Society for Technology in Education.

Bonals, J. & Sánchez, M., (2007). [Manual de asesoramiento psicopedagógico] Grao, Barcelona.

Gallardo, G. & Reyes, P., (2018). Relación profesor-alumno en la universidad: arista fundamental para el aprendizaje. *Calidad en la Educación*, 32, 78-108.

Imbernon, F., & Medina, J. L., (2008). Metodología Participativa en el aula universitaria. La participación del alumnado, Cuadernos de docencia universitaria, Octaedro, Barcelona.

Kagan, S., (1985). [Co-op co-op: A Flexible Cooperating Learning Technique], Learning to Cooperate, Cooperating to Learn, Plenum Press, New York, 437-462.

Kolb, D. A., (1984). [Experiential learning: Experience as the source of learning and development], Englewood Cliffs, NJ, Prentice-Hall.

Manero, C. B., Chavarría, P. L. & Navarro, M. M., (2011). Innovación en la docencia universitaria a través de la metodología. MTD. *Revista de educación*, 355, 233-234.

Noguero, F. L., (2006). Metodología participativa en la enseñanza universitaria. *Revista Interuniversitaria de Formación del Profesorado* 20(3), 313-316.

Núñez Flores, M. I., (2006). “El seminario método didáctico de la educación universitaria y la ideología (tesis doctoral)”. Universidad Nacional Mayor de San Marcos, Lima, Perú.

Pasco-Dalla-Porta, M. M., Lau, M., Ponce-Regalado, F., & Pacheco Mariselli, M. M. (2024). Pedagogical strategies and academic performance in theses seminars: a study in an undergraduate management program in Peru. *Journal of Applied Research in Higher Educatio*n, 16(1), 104-119.

Philp-Clark, C., & Grieshaber, S. (2024). Teacher critical reflection: what can be learned from quality research?. *The Australian Educational Researcher*, 51(2), 697-717.

Reyes, C.I., (2016). "La implantación del seminario como metodología activa en la Facultad de Ciencias". III Jornadas Iberoamericanas de Innovación Educativa en el ámbito de las TIC.

Sánchez, M. R., (2015). Metodologías docentes en el EEES: de la clase magistral al portafolio. *Tendencias Pedagógicas*, 17, 83-102.

Saroyan, A., & Amundsen, C. (Eds.) (2023). [Rethinking teaching in higher education: From a course design workshop to a faculty development framework]. Taylor & Francis.

UNESCO-Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura. (2015). La educación para todos, 2000-2015: logros y desafíos.