



New Trends
in Psychology

Adapting Chemistry Course Content for Students in Life Sciences Universities

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Abstract: *Chemistry* is a fundamental discipline in the initial training of life sciences students, providing the necessary theoretical basis for the understanding of the specialist disciplines studied later. In the current context, there are significant difficulties in the assimilation of content by students, determined by factors such as the diminishing of the theoretical basis acquired in pre-university education, the intrinsic complexity of discipline, the low motivation for learning and the limitations of educational resources. The present study aims to evaluate the students' perception on the clarity of the teaching of the *Chemistry* discipline and to identify the main difficulties encountered in the learning process. The research is based on the application of a structured questionnaire, which includes Likert items and open questions, distributed to first year students. The analysis of the answers allows highlighting the degree of concordance between the teaching strategies used and the real experience of the students, as well as the formulation of directions for optimizing the teaching process. The obtained results contribute to the adaptation of the didactic methods to the peculiarities of the current generation of students and to the increase of the efficiency of the educational process.

Keywords: chemistry; university teaching process; difficulty learning; student feedback

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1. Introduction

Within the universities for life sciences, the discipline of *Chemistry* is a fundamental element for understanding the biological, biochemical and technological mechanisms studied later. Beyond its curricular importance, *Chemistry* is a discipline with a high degree of abstraction, involving complex cognitive processes of organization, integration and transfer of information.

From the perspective of educational psychology, learning the fundamental scientific disciplines is conditioned by how the information is structured, by the level of cognitive load and by the perceived relevance of the content to the chosen field of study. When the cognitive requirements of a discipline exceed the processing capacity of students, there may be difficulties in comprehension, decreased motivation for learning, and a negative attitude towards discipline.

In recent years, higher education teachers have signaled significant differences between the initial training level of students and the academic requirements of fundamental disciplines. These discrepancies can generate cognitive overload, especially in the initial stages of the university course, favoring the accumulation of conceptual gaps and persistent difficulties in learning.

In this context, adapting the course content and the didactic strategies is not only a pedagogical necessity, but also an intervention with direct implications on the cognitive and motivational processes of the students. This paper analyzes the students' perception of the teaching of the *Chemistry* discipline, with an emphasis on the cognitive clarity of explanations, the perceived difficulty level and the relevance of the proposed applications, aiming to identify directions for optimizing the learning experience.

2. The Importance of Adapting the Content of *Chemistry* from the Perspective of Students' Learning Processes

From the point of view of learning psychology, the efficiency of the educational process is closely related to how didactic content is adapted to the cognitive characteristics of students. In highly abstract disciplines such as *Chemistry*, the selection and structuring of information plays a key role in preventing cognitive overload.

Overburdening complex theoretical information that is insufficiently contextualized can lead to superficial content processing and difficulties in integrating new notions into existing cognitive structures.

Another important factor is the correlation between theoretical and applied components. Experimental activities and concrete examples can facilitate the semantic anchoring of abstract concepts, supporting the formation of coherent mental representations. In the absence of this correlation, students may perceive discipline as being meaningless, which negatively affects intrinsic motivation and attitude towards learning.

Therefore, adaptation of the *Chemistry* content must be carried out in a student-oriented manner, considering not only the curricular objectives, but also the information processing capacity, previous experience and cognitive needs specific to the field of study.

3. Research Methodology

This research was designed as a descriptive, exploratory study aimed at investigating students' perceptions of the teaching and learning process in the subject of *Chemistry*. From an educational psychology perspective, the study aims to identify how students evaluate the cognitive clarity of explanations, the perceived level of difficulty, the pace of instruction, and the relevance of the content to their field of study.

The study participants were first-year students enrolled in life sciences programs who are taking the *Chemistry* course as part of the university curriculum. This sample was chosen because the transition from high school to college represents a critical stage from both cognitive and emotional perspectives, as it is frequently associated with difficulties in adapting to academic demands.

The research instrument used was a structured questionnaire, developed specifically for this study, which included both Likert-type items and open-ended questions. Likert-type items were used to assess dimensions such as the perception of the clarity of the explanations provided by the teacher, the cognitive difficulty of the presented content, the appropriateness of the teaching pace, and the usefulness of practical examples in facilitating understanding. These dimensions are considered relevant in literature for analyzing learning processes and cognitive load.

The open-ended questions were designed to give students the opportunity to freely express their opinions, experiences, and the difficulties they encountered during the learning process. These questions aimed to identify issues perceived as problematic, such as concepts considered overly abstract, the pace of instruction, or the lack of connection between course content and relevant practical applications. Students were also encouraged to offer suggestions for improving teaching activities, based on their own learning experiences.

The questionnaire was administered anonymously to ensure that participants expressed their opinions honestly and to minimize the effects of social desirability. Participation in the study was voluntary, and students were informed of the purpose of the research and that the data would be used exclusively for scientific purposes.

The quantitative data were analyzed using descriptive methods, with the aim of identifying general trends in students' perceptions. Responses to Likert-scale items were analyzed to highlight the level of agreement or disagreement with the proposed statements. Qualitative analysis of open-ended responses allowed for the identification of recurring themes relevant to understanding students' cognitive and emotional experiences in relation to the *Chemistry* course.

By combining quantitative and qualitative data, the methodology used allows for a comprehensive approach to the phenomenon under study, providing a detailed picture of how teaching strategies are perceived and internalized by students from the perspective of learning processes.

4. Results and Discussion

The results indicate that students face significant difficulties in processing chemical information. A significant proportion of respondents perceive introductory concepts as overly abstract, suggesting a high level of perceived cognitive difficulty and potential limitations in the conceptual integration of information.

Students emphasize the importance of using examples relevant to the life sciences, noting that the lack of such examples affects their ability to make sense of the theoretical content. From an educational psychology perspective, this situation reflects insufficient semantic anchoring of information, which can lead to rote memorization and difficulties in knowledge transfer.

The teaching pace is frequently cited as being too fast, given the students' initial level of preparation. This perception suggests a mismatch between instructional demands and students' cognitive processing capacity, contributing to conceptual gaps and a sense of academic insecurity.

The use of course materials and visual aids is viewed positively, but students believe these should be supplemented with interactive activities and additional explanations to clarify difficult concepts and reinforce understanding.

5. Conclusions

The study highlights the importance of addressing the teaching of the *Chemistry* discipline from a psychological perspective, centered on the student's learning experience. Their perceptions of content clarity, difficulty and relevance reflect cognitive and motivational processes essential to academic success.

Adapting the didactic content should not be regarded exclusively as a curricular intervention, but as an approach to optimize the cognitive processes involved in learning. Selecting relevant information, contextualizing theoretical notions and adjusting the pace of teaching can significantly help reduce cognitive load and increase motivation for learning.

In conclusion, the analysis of the perception of students provides valuable landmarks for improving didactic strategies and emphasizes the need to integrate the principles of educational psychology into the teaching of the fundamental disciplines of higher education.

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